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TWENTY-SEVENTH ANNUAL REPORT

OF THE

BOARD OF HARBOR AND LAND COMMISSIONERS.

FOR THE YEAR 1905.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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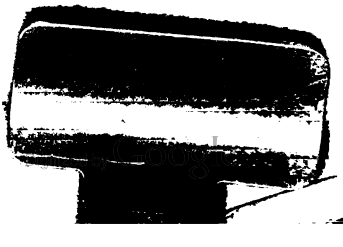

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Commonwealth of Massachusetts.

REPORT.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, pursuant to the provisions of law, respectfully submits its annual report for the year 1905, covering a period of twelve months, from Nov. 30, 1904, being the twenty-seventh annual report of the Board since its establishment by chapter 263 of the Acts of 1879.

From Dec. 1, 1904, to Nov. 30, 1905, the Board has held 211 meetings, has given 305 formal and informal hearings, and has received 161 petitions for license to build and maintain structures and for privileges in tide waters, great ponds and Connecticut River, to dredge material, to remove material from beaches, and for other purposes.

One hundred and six licenses for structures and privileges in tide waters, great ponds and Connecticut River have been granted during the year; also 48 permits for dredging, for the removal of material from beaches, and for other purposes.

Forty-eight inspections have been made at various times by and under the direction of the Board, of work completed and in progress; also of sites of authorized work, under appropriations made by the Legislature, relating to: dredging operations in Boston harbor; improvements on the Commonwealth's flats at South Boston; the reclamation of the Province Lands in Provincetown; protective works on Connecticut River at Agawam, Hadley, Hatfield and West Springfield; Bass River in Beverly; wall and jetties at Stony Beach in

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Hull; Stage harbor and Bucks Creek in Chatham; jetties and channel at Menamsha Inlet; jetties and channel at Lake Anthony; Vineyard Haven harbor; jetties and channel in Bass River at South Yarmouth; Lewis Bay in Yarmouth; East and West bays at Osterville; Cotuit harbor; Witchmere harbor in Harwich; Apponagansett harbor; Herring River in Harwich; Nantucket harbor; Cuttyhunk harbor; Paskamansett River in Dartmouth; site of proposed breakwater in Revere; Nashawena Island; also upon petitions and plans presented to the Board of the sites of proposed work in tide waters, the location of wrecks and obstructions to navigation; various structures built under licenses from the Board; sites of alleged dumping of material into tide waters; town boundary survey work; State boundaries.

Through transactions of the Board there has been paid into the treasury of the Commonwealth during the past year, from rents, licenses, sales of land and other sources, and credited to the Commonwealth's flats improvement fund and the harbor compensation fund for Boston harbor, the aggregate sum of $133,563.42.

During the year the Board made 13 new contracts,* involving the estimated expenditure of $72,741.88.

Boston Harbor.

Combined activity is essential to success in the competitive business of the present day. The greatness of the port of Boston is dependent not only on deep and commodious water ways, but upon the volume of business that can be attracted hither.

While the railroads are and must continue to be the great originators as well as transporters in enlarging the volume of exports, the merchants are the ones upon whom rests the responsibility of enlarging the volume of imports. It is a truism to assert that these volumes have interdependent trade relations.

The twelve months ending Nov. 30, 1905, show a value at the port of Boston of imports amounting to $106,993,964,

* See Appendix A.

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and of exports, both domestic and foreign, of $90,715,904, which together sum up $197,709,868. Of this, the total foreign exports were $839,628.

During the same period the coastwise tonnage of vessels entering and leaving the port was as follows, viz.: 5,618 vessels of all kinds from southern ports registered a gross tonnage of 6,262,217, and 3,322 vessels from eastern ports 2,530,415, or a total of 8,792,632; while the foreign net registered tonnage of 165 American vessels was 219,361 and of 1,349 foreign vessels was 2,559,528, or a total of 2,778,889.

A new steamship line, between this port and China, Japan and Singapore, or rather an extension of the service that has heretofore been plying to New York, has been established, and the first steamer arrived here November 24.

The Elder-Dempster line has announced the establishment of a line between Melbourne and Boston, with monthly sailings, but the first steamer has not as yet left Australia.

Our coastwise lines have been increased by the addition of the Maine Coast Transportation Company, which operates two steamers between here and ports of the State of Maine.

Of course freights, whether outward or inward, are relatively less at the port where the steamships can find a return cargo. Boston should be developed as a great entering and forwarding port for the cities of the mid-sections of the country. Importing merchants of the interior should be generally and continuously informed of the advantages in the way of speedy and courteous custom house examinations, economies in handling and facilities for inland transportation at reasonably low freights which may be enjoyed by patronizing this port.*

While the Federal government is deepening and widening the harbor channels and the Commonwealth is improving the anchorage basins and increasing the wharf accommodations, the merchants should persevere in providing the business, that nothing may be done in vain, and that working together the largest results may be accomplished concurrently with

* It is worthy of note that importations through the port of Boston during the fiscal year of 1905 increased 24 per cent., as against a gain of 13 per cent. at New York and about 12 per cent. at Philadelphia.

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the greatest economy toward holding the chief port in New England as the second in importance in the country.

Foreign commerce is a great educator, and the more of it we try to get and have to deal with, the earlier shall we begin to discover some of the problems essential to be understood in order to guide it in a desired direction.

Unwise legislation may interfere with its rapid development. Antagonistic interests may procure the establishment of obstacles. Uncontrollable differentials may assist in the diversion of exports to harbors less safe and easy of access and farther from foreign ports of destination. But the port of Boston is unalterably fixed in its physical and geographical relationship to the vast interior of this continent and in the path of easy transit to the eastern hemisphere.

What can be done by the Legislature of the Commonwealth and the merchants of greater Boston should be, in determining the right influences of legislation, both State and national, which, by aiding and not obstructing the laws of economical and commercial growth, may shape advancement on lines of safe and sure progress, while avoiding the errors of ignorance.

A decade ago a commission was appointed to investigate the wants of Boston for improved docks, wharves and terminal facilities. In January, 1897, the commission made its report to the Legislature, recommending on the part of the Commonwealth public ownership of a portion of the fore shore; the building of a great pier with a proper avenue of approach; the improvement of the anchorage basins; changes in the railroad tracks and terminals at East Boston; also the improvement of the harbor channels and the building of a large dry dock at the Navy Yard by the Federal government.

The recommendations were timely; already had begun the change in the draft and carrying capacity of transatlantic steamships, which marked the advance in requirements for channels, docks, basins and piers far in excess of any demands hitherto made.

A comparison of sizes of the mail steamships built by the Cunard Company within the last forty years may be interesting and instructive: —

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	1865. "Java."	1884. "Umbria."	1905. "Carmania."
Length,	337′	500′	672′ 6″
Breadth,	42′ 6″	57′ 3″	72′
Depth,	27′ 7″	39′	52′
Gross tonnage,	2,697	8,127	19,524
Indicated horse-power,	2,650	14,500	21,000
Speed in knots,	14	19.5	19

The weight or displacement of the "Carmania" when loaded to a draft of 33′ 3¼″ is calculated to be 30,918 tons. It is said that there is no indication at present that transatlantic steamships have reached their ultimate development as to size, and the recent application of the epoch-making steam turbine for power in place of the reciprocating engine surely adds a new and uncertain factor in any calculations.

To anticipate the requirements of the largest class of vessels, the harbor channels had to be widened and deepened, and the projects for improvement by the Federal government were made to keep pace with the movement. The economic advantages of larger vessels became so conspicuous as to extend their influence to the coastwise carriers, and the coal and lumber schooners increased beyond the five mast limit to six and even to one of seven masts, with a loaded draft of 28 feet when carrying 8,000 tons of coal. This increased draft led directly to a desire for greater depth of water when lying at anchor, and thus the anchorage basin project off Bird Island flats became an early necessity; and where formerly that well-known anchorage area had but an average of about 13 to 18 feet at mean low water, there is at present a depth of 30 feet over the area thus far completed. By the time the existing projects of both the State and national governments are carried out, others will be needed to enable the accommodations and required facilities to keep pace with the demand and maintain the port as one of the first order.

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The original project for improving the channels of the harbor was adopted by Congress in 1867. The lower main ship channel below President Roads had then in places a width of only 150 feet, with a depth of 23 feet; and the upper main ship channel above President Roads had a least width of 100 feet and a least depth of 18 feet. In 1892 the Federal government proposed to widen these channels to 1,000 feet, with a depth at mean low water of 27 feet. This project is substantially completed.

In 1899 the project of making a new channel entrance to the harbor through Broad Sound, 30 feet deep and 1,200 feet wide, was adopted. That channel is now completed, and a lighthouse at its entrance has been erected on the Graves, from which the light was first exhibited Sept. 1, 1905, completing, with the range lights on Lovells Island for the seaward arm, and on Spectacle Island for the inner arm, the lighting of that channel. In 1902 the project of deepening the upper channel above President Roads to 35 feet, with a width of 1,200 feet, and of cutting an entirely new channel through Broad Sound, 35 feet deep and 1,500 feet wide, was adopted. In carrying out this project it was thought best to split it lengthwise; and now the upper channel is being dredged 600 feet wide, or one-half the width; and when completed so as to give access to the steamship and railroad wharves, the other half will be undertaken. Thus the commerce of the port will not be delayed for the completion of the whole project before enjoying some of the benefits intended. It is expected that the dredging of the limited width of channel 35 feet deep from the sea to the wharves will be completed by Dec. 31, 1907. The completion of the entire project of 1902, however, will not afford free access to the wharves of the New England Railroad company and the Commonwealth pier; but it will be necessary to increase the width of the main ship channel some 700 to 800 feet for a length of half a mile, in order to provide an approach similar to that enjoyed by the other railroad and steamship wharves in the harbor above. This additional project should be urged before Congress in due time.

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Anchorage.

By chapter 476 of the Acts of 1901, the Board was authorized to excavate a basin and to build and maintain structures in Boston harbor northerly of the main ship channel, for the purpose of providing mooring facilities and additional anchorage ground. The expenditure of $1,000,000 was authorized by this act, not more than one-fourth part to be expended in any one year.

In 1902 contracts were entered into for dredging an area lying along the northerly side of the main ship channel in the upper harbor, covering about 1 mile in length and 1,000 feet in width, to a depth of 30 feet at mean low water; and for the purpose of doing the work economically and expeditiously, the total area was divided into four sections of nearly equal areas and excavation.

Since the report of last year an additional amount of 160,021 cubic yards has been excavated wholly from sections 1 and 2, leaving 443,814 cubic yards yet to be dredged. In sections 3 and 4 about 581,217 cubic yards are yet to be removed.

The reason of the slow performance by the contractors is their having contracts with the Federal government for excavating portions of the main ship channel of Boston harbor; and, inasmuch as the government project and its completion seemed to the Board of paramount importance, it has refrained from taking severe measures to compel the progress of the work on the anchorage basin while all the dredging machines of the contractors were engaged in the work of the government on the main ship channel.

The space available for the anchorage of deep-draft vessels has been materially increased, and as yet there seems to be no suffering for lack of larger area on account of the delays.

The approximate amount of material, scow measurement, remaining to be excavated from each section, and the total amount, scow measurement, excavated to Dec. 1, 1905, are as follows: —

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	Total Amount excavated to Dec. 1, 1905 (Cubic Yards).	Approximate Excavation to be made (Cubic Yards).
Section 1, ...	553,784	189,716
Section 2, ...	495,202	254,098
Section 3, ...	440,783	302,917
Section 4, ...	474,100	278,300
Totals, ...	1,963,869	1,025,031

The total amount expended on this project to Dec. 1, 1905, is $275,707.07.

Dorchester Bay.

The dredging of anchorage basins in Dorchester Bay, off the southerly shore of South Boston, authorized by chapter 425 of the Acts of 1902, has continued during the year under contract with the Eastern Dredging Company and the New England Dredging Company, jointly, made Oct. 29, 1902, at the price of 21 cents per cubic yard, measured in scows, the work to be done during the years 1902–03–04–05, and the expenditure not to exceed $25,000 in each year. The contract provided for the completion of the work June 15, 1905, and for the excavation of two areas respectively known as the 9-foot area and the 6-foot area. The 6-foot area is located near the L Street bath house and the landing of the Mosquito Fleet Yacht Club, and the dredging of this area was completed early in June, 1905.

The dredging of the 9-foot area, located near the public landing of the South Boston and Boston Yacht Club houses, was unavoidably delayed, and could not be completed at the date specified, an area of about 375,000 square feet still remaining to be excavated. The work was suspended June 15 for the summer, in order that the dredge and mud scows might not interfere with the use of the area by the yachts. The remaining work will be completed during the winter and spring, so that the whole area will be available

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for anchorage before the beginning of the next yachting season.

During the year 105,965 cubic yards have been excavated, making a total of 445,214 cubic yards to Dec. 1, 1905. The total amount expended to the same date is $82,648.96. The balance of the appropriation will be expended in completing the work.

Dredging Easterly Shore of Dorchester.

Under authority of chapter 439 of the Acts of 1903 the channel leading from the main channel of Neponset River was enlarged in 1904, and extended northwesterly from the main channel about 700 feet, 75 feet wide on the bottom and 12 feet deep at mean low water. An anchorage basin for the use of yachts was also dredged between Savin Hill and Commercial Point in this locality, covering about 4½ acres, 9 feet deep at mean low water, the total amount expended for this improvement to Dec. 1, 1904, being $25,363.66.

By chapter 453 of the Acts of 1905 the Board was authorized to dredge the channel leading from Commercial Point in a northwesterly direction, in extension of the channel dredged under authority of chapter 439 of the Acts of 1903, to a depth not exceeding 12 feet at mean low water and to a width not exceeding 75 feet, the act of 1905 permitting the expenditure of $5,000 therefor in the year 1905, and the same amount in 1906.

Proposals for dredging a channel about 1,600 feet long, 75 feet wide on the bottom and 12 feet deep at mean low water, were received on Oct. 26, 1905, and contract entered into Oct. 30, 1905, with the New England Dredging Company, the lowest bidder, the contract price being 23 8/10 cents per cubic yard, measured in scows. The amount of excavation is estimated to be about 35,500 cubic yards, *situ* measurement, the work to be completed by May 31, 1906.

The total amount expended on this improvement since the passage of the act of 1903 aforesaid, to Dec. 1, 1905, is $26,359.19.

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Commonwealth Flats at South Boston.

The Commonwealth owns a large tract of filled land at South Boston, commonly known as the South Boston flats, shown on the plan accompanying the annual report of the Board for 1903, and located both northerly and southerly of Summer Street, easterly of the railroad terminal, and having a long frontage on Boston upper harbor and the reserved channel.

The area northerly of Summer Street is 4,317,234 square feet, or 99.1 acres exclusive of pile piers, but including the filled portion of the Commonwealth pier, 4,662,234 square feet, or 107.2 acres; of this area, 792,287 square feet, or 18.2 acres, is under lease. The area southerly of Summer Street, exclusive of streets, is 1,917,347 square feet, or 44 acres, of which 88,221 square feet, or 2 acres, is under lease, and 304,560 square feet, together with 47,000 square feet in two cross streets, or 8.1 acres in all, is used temporarily as a public playground, under authority of chapter 421 of the Acts of 1891.

The lease from the Commonwealth to Curran & Burton, dated June 15, 1900, of 267,320 square feet of land and two pile piers, northerly of Summer Street, has been renewed for a period of ten years from Oct. 1, 1905, in accordance with the option contained in the original lease.

No new sales or leases of these lands were made during the year.

The sewers, drains and streets have been maintained, and the filling of the various lots to the required grade has been carried on by free dumping of selected material suitable for making a hard and firm surface.

Commonwealth Pier.

Under authority of chapter 513 of the Acts of 1897, the Commonwealth has built a pier on its property at South Boston, 1,200 feet long and 400 feet wide, with a dock on the westerly side 175 feet wide at the outer end, 200 feet at the inner end and 30 feet deep at mean low water. There is also a berth at the outer end of this pier, having the same

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depth as the dock. The total cost of this pier to Dec. 1, 1905, is $381,877.09, paid from an appropriation of $400,000 made by the act of 1897 aforesaid.

The use of this pier has been limited thus far by reason of delay in constructing Northern Avenue and bridge, which eventually will bring it into direct communication with the city proper. As the construction of this bridge and avenue is now assured, it is expected that the Commonwealth will soon receive a return from its investment.

The sum of $230 has been collected and paid into the treasury of the Commonwealth during the year for the use by vessels of the dock on the westerly side of the pier.

Northern Avenue and Bridge.

Under the provisions of chapter 381 of the Acts of 1903, authorizing the laying out and construction of Northern Avenue and bridge across Fort Point Channel and the land of the New England Railroad Company, the Boston Wharf Company and of the Commonwealth at South Boston, the State is required to pay to the city of Boston from time to time, as the work progresses, upon the order of this Board, the sum of $260,000.

General plans for this bridge, providing for two draw openings, each not less than 75 feet wide, were approved by the Board on July 18, 1904, and by the Secretary of War on April 11, 1905, after hearing before the United States engineer officer in charge of river and harbor work in this district, whereof a full statement appears in the report of the Board for 1904, pages 19–26. Detail plans of construction were approved by the Board on Aug. 25, 1905, and the city of Boston has entered into a contract for an abutment and piers, which requires the completion of that work by November, 1906. It is expected that the bridge will be fully completed in the year 1907, and with Northern Avenue will give direct access to the lands of the Commonwealth and to the Commonwealth pier.

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The Commonwealth's Flats at East Boston.

This tract of land and flats is located at and near Jeffries Point in East Boston, and was purchased and taken by the Commonwealth under authority of chapter 486 of the Acts of 1897, the appropriation therefor being $100,000.

The question involving the title of the East Boston Company, the largest owner, to certain of these flats taken as aforesaid, is still pending in the Land Court, under the charge of the Attorney-General.

The total amount expended on account of this property to Dec. 1, 1905, is $25,138.79.

Fort Point Channel.

The mid-channel originally had a depth of 16 feet at its mouth and an average of 12 feet thence to Federal Street bridge. The Congress in 1886 authorized dredging a channel 175 feet wide and 23 feet deep at mean low water, about 4,200 feet long, to a point near Federal Street bridge, at an estimated cost of $100,000. But a small portion of this sum, however, has been expended, to wit, $18,027, by reason of the obstruction presented by the old New England Railroad bridge. Although that obstruction was removed in 1898, no further sum has been expended in the furtherance of this project.

As a consequence, the channel has proved inadequate for steamships navigating that thoroughfare; and this Board has been called upon at various times to improve the channel by dredging, for the purpose of enabling vessels to approach the wharves to which they were destined.

The commerce which navigates this channel terminating in South Bay has increased until it is now claimed to be annually greater than that which enters the harbor of Portland.

Under these circumstances, this Board has seen fit to present the situation to the Federal government, and urge resumption of work in carrying out the original project. Meanwhile, the pressure for dredging in special localities has induced the Board, without waiting for the action of Con-

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gress, to dredge an area of 96,000 square feet to the depth of 18 feet at mean low water above Congress Street bridge, whereby 14,204 cubic yards of material were removed under contract, at a cost of 29 cents per cubic yard, in August; and later, in November, to execute a contract for dredging another area between Mount Washington Avenue and Federal Street bridges, of 52,000 square feet, to a depth of 16 feet, for 29 cents per cubic yard.

These two improvements by the Commonwealth, though inadequate, will temporarily relieve the situation, and also more than compensate for any shoaling caused by dumping snow and ice. An examination made in June, upon complaint of shoaling in the channel, showed that a small proportion only was caused by the dirt mixed with snow and ice dumped during the winter, but that the greater elements were clay, coal and coal dust, cinders and ashes carelessly and unlawfully deposited, either deliberately or in process of doing other work.

The total amount expended during the year was $4,263.96, paid from the income of the harbor compensation fund.

South Bay.

No substantial amount of work has been done under a contract entered into with the Roxbury Central Wharf Company, April 8, 1904, for dredging a channel across the southerly end of the bay, in extension of the channel dredged by the Commonwealth in 1902, about 375 feet long, 110 feet wide on the bottom and 12 feet deep at mean low water, and which calls for the expenditure of $8,000; but it is anticipated that the work will be completed during the coming season.

The total amount expended from the "Improvement of South Bay in the city of Boston fund," created by chapter 278 of the Acts of 1898, to Dec. 1, 1905, is $49,341.24. The balance in this fund Nov. 30, 1905, was $10,096.26.

Charles River.

In March complaint was received from the Boston & Maine Railroad that a ledge located on the edge of the channel of Charles River, about opposite the westerly end of the draw

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pier on the upper side of its southern division passenger bridge, had become an obstruction to the safe passage of vessels, owing to the change made in the draw-way in its freight bridge which had been rebuilt in accordance with requirements of the Charles River basin act, chapter 465, Acts of 1903.

The most direct and natural line between the draw-ways of the two bridges now lies directly over the summit of the ledge. Also, owing to the change in the freight bridge, it has become necessary to dredge an entirely new channel to the berth at the coal pockets of the railroad company at the Cambridge shore between the two bridges. In order to reach this channel it is necessary to make a sharp turn around the ledge, and in this case also the most direct track for vessels would be directly over the location of the ledge.

For the purpose of determining the extent of the obstruction, a survey was made of the ledge during the month of April, and there was found a depth of only 8.3 feet of water over it at mean low tide. The removal of the ledge to the depth of 18 feet at mean low water, which would accommodate practically all the vessels likely to navigate the river, would require the excavation of 1,170 cubic yards of ledge, and in addition a small amount of sand and gravel.

Copies of the plan of the survey were sent to the Boston & Maine Railroad and the Charles River Basin Commission.

The cost of this survey, amounting to $91.80, was paid from the appropriation for survey and improvement of harbors.

Jeffries Point.

By chapter 463 of the Acts of 1905 the Board was directed to dredge a channel in the flats near Jeffries Point, contingent upon the performance of a condition by the owners of land adjacent. The contingency not having arisen, the dredging has not been done.

Stony Beach, Hull.

By chapter 253 of the Acts of 1905 an appropriation of $1,500 was made, to be used in addition to the unexpended balance of $1,647.15 appropriated by chapter 483 of the Acts

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of 1901, for extending and completing the sea wall at Stony Beach, in Hull. This wall was constructed to prevent the sea from breaking through the ridge of beach connecting Point Allerton with the village of Hull, and preventing the sea from cutting off access to the village from the neck of main land.

It was found upon examination that a short section of the westerly end of the wall built in 1901 had been undermined and broken off; and on Aug. 25, 1905, a contract was entered into with William L. Miller, the lowest bidder, to remove the broken end of the wall and build an extension about 300 feet long, with two spur jetties, each about 50 feet long, from the end of the wall built in 1901 to a connection with the stone riprap protecting the embankment of the New York, New Haven & Hartford Railroad built along the beach at this point. The contract price was $8.23 per lineal foot of sea wall, and $3.52 per lineal foot of spur jetty. This work was completed Oct. 18, 1905, at a cost of $2,728.82.

The beach in front of the portion of the wall built in 1901 has been strengthened by the wash of sand and pebbles filling the old bays between the spur jetties for about one-half the length of the wall toward the easterly end. The new wall built this year extends 4 feet deeper than the portion of the old wall adjacent to it, and its westerly end is thoroughly protected by the riprap of the railroad, so that there is very little probability that it will ever be undermined or disturbed.

The total amount expended at Stony Beach, Hull, to Dec. 1, 1905, is $10,662.93.

Weymouth Fore River and Town River.

By the river and harbor act of Congress, approved March 3, 1905, $57,500 was appropriated for dredging Weymouth Fore River below Quincy Point, upon the condition that the Commonwealth or other parties should assume the maintenance of the improvements made in the river above Quincy Point and the improvement made in Town River, without further expense to the United States other than the sums already provided.

The Commonwealth, by chapter 103 of the Resolves of

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1905, assumed the responsibility of complying with this condition. The work of improving the channel by the Federal authorities has been in progress during the latter part of the season.

The Congressional appropriations already available were sufficient to complete the projected improvement of Town River and the re-dredging of the portions previously dredged, so as to leave the whole project in satisfactory condition.

In Fore River the Federal funds available were only sufficient to complete the dredging in accordance with the existing project, and in addition to barely commence re-dredging the channel previously dredged, which had filled in.

The cost of completing the re-dredging, if required by the Secretary of War in order to make the improvement conform to the project as estimated by the United States Engineers, would be about $16,653. Whenever a demand for deeper water in the upper reaches of the Fore River shall be made, the condition of the resolve would seem to require the Legislature to make an appropriation for the necessary dredging.

The lower reaches of Weymouth Fore River have been improved by the Commonwealth, as stated in the report of the Board for 1904, page 13, under an appropriation of $25,000 made by chapter 440 of the Acts of 1903, the total expenditure therefor to Dec. 1, 1905, being $10,235.87. No dredging has been done by the Commonwealth in Town River.

Land for Naval Magazine.

By chapter 446 of the Acts of 1905 the consent of the Commonwealth is granted for the acquisition, by purchase or condemnation, by the United States, of lands situated in the towns of Hingham and Weymouth, lying on both sides of and in the bed of Weymouth Back River, containing about 1,100 acres, to be described in a plan or plans to be approved by the Harbor and Land Commissioners, and to be used for the purposes of a naval magazine and for other purposes of national defence.

The approval of the Board was given on Sept. 25, 1905, and the plan entitled "Plan of lands at Hingham and Weymouth, Mass., to be acquired by the United States of America

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as the Site for a Naval Magazine under Act of Congress approved March 3, 1903, Scale 1: 2500 June 1905," is on file in the office of the Secretary of the Commonwealth.

Hangman's Island.

On Jan. 1, 1905, the Board leased to William J. Greenfield, one of the former lessees, Hangman's Island, in Boston harbor, for a term of three years from that date, the annual rental being $50. It is well to have fishermen continue to occupy this island, as they have been helpful from time to time as life-savers.

Revere Breakwater.

By chapter 108 of the Resolves of 1905 the Board was instructed to build a breakwater north of Cherry Island bar and east of Eliot Circle in the town of Revere, of such size and character as to provide a safe anchorage for yachts and to protect the shore property from damage by the sea.

After a number of inquiries and visits to the locality, and a conference with residents of Revere at the office in August, a survey was made of the locality. It was found that a breakwater extending north from what is known as Half Tide Rock, which is located just north of the bar and about half way between the shore and the outer end of the bar, which could be built for the appropriation, would afford but slight protection for an anchorage ground; and the area protected would not, in the opinion of the Board, be large enough to justify the construction of the breakwater, nor would the shore property receive much if any benefit, and might be injured.

Plans were then made for a breakwater which would afford protection over an anchorage area of 900 by 600 feet, having a depth of from 6 to 7 feet at mean low water, with incidental protection to shore property from damage by the sea. The cost of this was estimated to be not less than $55,000. This estimated cost exceeded the appropriation by $30,000. The resolve provides that any expense necessary for the complete construction of a breakwater after the expenditure of the money hereby appropriated shall be incurred and borne

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by the town of Revere or the citizens thereof. A communication was addressed to the selectmen of the town, stating that so soon as the Board is informed that the town or its citizens appropriated and made available for use the additional sum of $30,000, immediate action would be taken in furtherance of the project. No reply has been received to date.

Inasmuch as the Board felt unauthorized to expend any of the appropriation unless it was sure of being able to fulfill the intent of the Legislature to secure the completion of a project toward which it intended to apply only the sum of $25,000, no obligation has yet been incurred.

Saugus River.

By chapter 27 of the Resolves of 1905 the Board was directed to make a survey of Saugus River between the Salem turnpike and Broad Sound and report thereon, together with estimates of the cost of dredging a channel to such depth and width as the Board may deem advisable.

A survey was made in accordance with the provisions of the resolve, together with an estimate of the cost.

The field work was done between June 19 and August 21. A plane table survey was made of the shore lines and bridges on a scale of 1 to 2,000, and soundings taken covering the whole width of the river from Salem turnpike to the Point of Pines and out across the bay to the deep water of Broad Sound, covering a width of about half a mile. The river from the turnpike to the Boston & Maine Railroad bridge, a distance of about half a mile, has an average width of 600 to 700 feet between the banks; below, as far as its mouth at the Point of Pines, it averages nearly 1,200 feet between the banks. The low-water channel averages about 500 feet in width from Salem turnpike to its junction with Pines River, about midway between the Boston & Maine and the Boston, Revere Beach & Lynn Railroad bridges.

The channel depth in this section is a little over 4 feet at mean low water, except where it has been dredged to a greater depth. At the present time the dredged channel extends from the junction of Pines River to the works of the General Electric Company, and has a depth of about 10 feet at

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mean low water. The berth at the Electric Company's wharf has a depth of about 14 feet at mean low water.

Below the junction with Pines River to a point about half a mile below the wharf at the Point of Pines the channel widens, varying from about 400 to 600 feet, with a depth of from 7 to 20 feet at mean low water. Below this point the channel extends through the open bay to the deep water of Broad Sound.

Two sections of this channel were dredged by the United States government to 8 feet at mean low water for a width of 150 feet. Both these sections have since shoaled, so that there is now but 6 feet at mean low water over the bar, which is a little more than a mile below the Point of Pines.

At a conference with the representatives of owners of property bordering on the river, it was stated by those representing the General Electric Company, who at the present time are practically the only parties having vessels coming up the river, that a depth of 12 feet at mean low water will accommodate all the vessels which would be likely to navigate the river, the principal business now being the transportation of coal.

In order to accomplish this result, two estimates have been prepared, one for a channel 12 feet deep all the way from Broad Sound to the Salem turnpike, and the other 15 feet deep from the open bay to the mouth of the river at the Point of Pines, and 12 feet deep the balance of the way, as it seemed that the channel through the open bay was much more liable to silt up and reduce the depth than a channel in the river itself. Also, the waves in the open bay would cause vessels to pitch at times to a greater or less extent, and in order to prevent the vessels touching bottom, more depth would be required than in the still waters of the river. The width of the channel in each estimate is the same, being 200 feet on the bottom from the Point of Pines to the sea, and flaring out to about 400 feet in the last 2,000 feet. From the Point of Pines to the new highway bridge at the mouth of the river the width gradually narrows from 200 to 100 feet at the bridge. Between the highway bridge and the Boston, Revere Beach & Lynn Railroad bridge the width is again reduced to

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75 feet, as in this section vessels will be continually alongside the draw piers of the bridges. Above this railroad bridge it widens again to 100 feet, and continues at this width to the Salem turnpike.

The amount of material to be excavated under these two projects is as follows: —

	12 Feet (cu. yds.).	15 and 12 Feet (cu. yds.).
In the portion of the channel from the Point of Pines to Broad Sound,	180,000	360,000
Portion of channel above Point of Pines,	108,000	108,000
	288,000	468,000

The river is crossed by three bridges: two, the State highway or parkway bridge and the Boston, Revere Beach & Lynn Railroad bridge, being between the Point of Pines and the mouth of Pines River; and one, the Boston & Maine Railroad bridge, just above the mouth of Pines River.

The highway bridge is a double-leaf Bascule draw, with a clear opening of 50 feet. The Boston, Revere Beach & Lynn Railroad bridge has a revolving turn-table draw, with a clear opening of 37 feet, which is probably wide enough for the present. The Boston & Maine Railroad bridge has a jackknife draw, with a clear opening of 34 feet, which should be rebuilt when the channel is improved.

The estimated cost of excavating the channels is as follows: —

For channel 12 feet deep throughout its length: —	
288,000 cubic yards, at 25 cents,	$72,000 00
Supervision and contingencies,	5,000 00
	$77,000 00
For channel 15 feet deep from Point of Pines to sea and 12 feet deep above: —	
468,000 cubic yards, at 25 cents,	$117,000 00
Supervision and contingencies,	8,000 00
	$125,000 00

These estimates are based upon the scheme of excavating the material and towing it to sea.

The very considerable and growing commerce which would

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navigate a channel enlarged in accordance with this project would seem to recommend it as being worthy of improvement by the Federal government.

Out of the appropriation of $1,000 there has been expended to Dec. 1, 1905, $638.53.

Bass River, Beverly.

The dredging of the channel in Bass River at Beverly under chapter 341 of the Acts of 1903, which was commenced in 1904 under a contract with Charles H. Souther and John H. Gerrish, was completed Dec. 1, 1905. This channel is 6,600 feet long, 100 feet wide on the bottom, except through the ledge in the upper portion of the river, where the width is reduced to 75 feet, and 9 feet deep at mean low water, and enables vessels to reach the coal and lumber wharves in Beverly and the new wharf of the United Shoe Machinery Company.

The Commonwealth appropriated $25,000 toward the cost of the work, which has been expended. The balance of cost, $55,535.75, is the amount to be borne by the city of Beverly, of which there has been paid to Dec. 1, 1905, the sum of $43,736.08.

The total cost of the work is as follows: —

Earth excavation,	$67,041 54
Rock excavation,	10,989 60
Surveys and incidental expenses, including $539.81 paid for preliminary survey from appropriation for survey and improvement of harbors,	3,044 42
Total,	$81,075 56

Of this amount there has been expended to Dec. 1, 1905, $69,275.89.

Danvers River.

On June 1, 1905, a petition was received from the county commissioners of Essex County for the approval of plans and specifications for a bridge and approaches across Danvers River, between Salem and Beverly, as authorized by chapter 371 of the Acts of 1903.

The provisions in section 3 of the act, that "no money

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shall be expended until the plans and specifications for the bridge and its approaches have been approved by the board of harbor and land commissioners," required of the Board something more than the approval of plans; so that after a public hearing, at which was developed wide and earnest concern as to the location and the approaches, a personal examination was made of the locality and surroundings. At a later date, to wit, Oct. 30, 1905, the county commissioners presented modified plans, containing a change in location of bridge and approaches, which were, on Nov. 24, 1905, approved. The draw will have a clear opening of 50 feet.

Annisquam River.

Chapter 88 of the Resolves of 1904 authorized the excavation of a channel in the upper portion of Annisquam River, 50 feet wide and 6 feet deep at mean low water, from Wolf Hill to Gloucester harbor, according to a plan made by the Board under the provisions of chapter 71 of the Resolves of 1903, at an expense of not more than $50,000, of which sum not more than $17,000 shall be expended in any one year. To carry out this project, releases have been secured from all but one of the abutting property owners, and the Boston & Maine Railroad has signified its willingness to make the necessary changes in its bridge.

The plans and specifications for the new bridge at Western Avenue, to be built by the county commissioners of Essex County over the "canal" at the southerly end of the proposed channel, under authority of chapter 254 of the Acts of 1905, were finally approved, in conference with the county commissioners, on Nov. 20, 1905.

Upon information that the city of Gloucester is preparing to acquire for park purposes the eastern bank of the canal which forms a portion of the proposed channel, including as part of the taking the area whose owner has not given a release to the Commonwealth, the Board is awaiting the result.

Presumably all necessary action may be taken during the winter, so that the work on the channel may commence early in the spring.

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The total amount expended on this project to Dec. 1, 1905, is $1,399.28.

Connecticut River.

By chapter 344 of the Acts of 1885 this Board was given the general care and supervision of the Connecticut River and its banks and of all structures therein, to prevent and remove unauthorized encroachments and causes of every kind which may in any way injure the river, and to protect and develop the rights and property of the public therein.

Hatfield. — The dikes constructed in 1904 on the banks of the Connecticut River in the town of Hatfield under chapter 82 of the Resolves of 1903 are efficient, and prevent the river at high water from flowing across the meadows, where it was feared it might cut through and make a new channel.

During the summer, in order to prevent the river at times of high water from flowing in upon the upper side of the dikes built in 1904, where it was liable to create eddies and do damage, a dike with culvert and swinging gate was built across the mouth of the ditch or drain just north of the dikes previously built. As this dike was to be 12 feet high, and would have to withstand the pressure of water nearly its full height, it was constructed with a core of cement concrete. The outer or river face of the dike was protected by stone riprap, and the bottom and sides of the ditch at each end of the culvert through the dike were protected by stone paving grouted with cement mortar.

The work was done under contract with Daniel O'Connell's Sons of Holyoke, the lowest bidders. The money was available from the balance of the appropriation of $7,500 made in 1903, of which the sum of $2,389.76 remained unexpended. A petition of the inhabitants of the town, requesting that the dike should be built, was filed with the Board. The total cost of the work, including surveys and supervision, was $1,590.51. These dikes have been transferred to the town of Hatfield for care and maintenance.

The total amount expended at Hatfield to Dec. 1, 1905, is $6,700.75.

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Hadley. — In the early summer, at the request of the selectmen of Hadley, an examination was made of the riprapping of the river bank on the upper side of the village of Hadley. A portion of the bank which was riprapped in 1888–1889 was graded quite steep, and along the summer water line the brush rotted out and the water undermined the stone, which in places had slipped down, thus removing the protection to portions of the bank.

Some of the riprap was replaced in 1904 and the gaps filled in, thus affording an efficient protection. This summer additional places were found to have caved in, but not to such an extent as to require immediate attention, and it seemed best to let the bank remain another year before undertaking further repairs. It will probably be necessary to do additional work on this section the coming year.

The total amount expended at Hadley to Dec. 1, 1905, is $60,864.41.

West Springfield. — In West Springfield, at Riverdale, the river has been for some time undermining and wearing away a portion of the natural bank. A shore owner had heretofore riprapped about 50 feet at considerable expense. There was danger of a continuance of the injury. A chance for securing a large amount of stone suitable for riprapping at a very low cost presented itself, and the Board, in co-operation with the shore owner, took advantage of the opportunity. The work was done under the supervision of the engineer and to the satisfaction of the Board, and will probably save a much larger expenditure.

About 250 lineal feet of the river bank were thus protected, extending from above the highest flood level to below the low-water level of the river. The total cost of this work to the Commonwealth was $135.

The total amount expended at West Springfield to Dec. 1, 1905, is $5,051.49.

Agawam. — The willows along the bank of the river in the town of Agawam have grown up so that they have begun to obstruct the view of the river from the highway and are complained of as breeding mosquitoes. It seemed to the Board, however, that these willows had not at the present

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time grown sufficiently to need cutting, and that they would more effectually prevent the washing of the bank if allowed to grow a year or two longer.

The total amount expended in protecting the river bank at Agawam to Dec. 1, 1905, is $8,005.76.

The total amount expended to Dec. 1, 1905, in protecting the Connecticut River banks in Hatfield, Hadley, West Springfield and Agawam, is $60,622.41.

Under the authority given the Board by chapter 58 of the Resolves of 1902, four of the scows used in riprapping the river bank were sold to the Boston & Maine Railroad for the sum of $189, which was paid into the treasury. Two of the scows still remain stored at Hadley. They were used in 1904 for repairing the riprap work, and will probably be required for similar work in the future.

Green Harbor.

By chapter 393 of the Acts of 1904 an appropriation of $10,000 was made for dredging at Green Harbor in the town of Marshfield. There has been no expenditure from this appropriation, as the Board is still of the opinion expressed in its report for 1904, page 33, that it is inadvisable to contract for the dredging until both jetties have been built up, and under the terms of the act it does not feel authorized to spend any of the appropriation to rebuild or repair the jetties. It is estimated that a proper building up of the jetties would cost not less than $15,000.

The total amount expended for the construction of stone jetties, for dredging, etc., to improve this harbor since beginning work in 1898, to Dec. 1, 1905, is $65,961.42.

Scituate.

As appears in the report of the Board for 1902, out of the appropriation of $15,000 for protecting the shores and harbor of the town of Scituate, the sum of $12,189.03 was expended in building 2,448 feet of sea wall.

In December, 1904, John B. Damon made a claim for damages to his property by building the wall on the crest of the beach lying between Damons Island and The Glades at

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North Scituate. The Board, believing that his property had received a substantial benefit by the building of the wall, declined to award damages. A suit was brought, and he recovered a verdict of $3,833.83 from a Plymouth County jury. Subsequently a settlement was made through the office of the Attorney-General by the payment of $2,000 in full satisfaction.

Stage Harbor, Chatham.

By chapter 47 of the Resolves of 1903 the Board was authorized to build a timber dike and structures to close the breach at the eastern end of Stage harbor in Chatham, to protect the harbor from encroachments or damage by the sea, and an appropriation of $5,000 was made therefor.

By chapter 90 of the Resolves of 1904 $1,000 additional was appropriated, the first appropriation having been found insufficient for doing the work.

In 1904, owing to changes which had occurred in the outer beach, and at the request of inhabitants of the town, the Board decided to delay the construction of the dike.

In the spring of 1905, the outer beach at Chatham meanwhile having been broken through by the sea at a point nearly opposite the passage into Stage harbor, it was decided that the structures were absolutely required; and on June 27 a contract was entered into with Joseph J. Callahan, the lowest bidder, to build them as originally designed.

After the work was commenced it was found that the changes which had been and were taking place were of such a nature that it was necessary to extend the dike further across the marsh. Later, during the construction of the dike across the main portion of the passage, so much sand was washed out by the current that in order to protect the timber from the worms it was found necessary to bank the timber work with sand up to the low-water level. The rapid changes in the sand caused by the action of the sea through the break in the outer beach necessitated additional construction, in order to preserve the harbor and render effective the original project.

This unforeseeable additional work made the total cost ex-

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ceed the amount of the appropriation by $1,475.37, which will be paid from the appropriation for the survey and improvement of harbors. All of the work at this harbor has been completed at a total cost of $7,475.37, of which there has been paid to Dec. 1, 1905, the sum of $6,051.13.

Lewis Bay.

In 1899 surveys and examinations were made of Lewis Bay in the towns of Barnstable and Yarmouth, also estimates of the cost of improving the channels leading from Hyannis harbor into the bay and up to the landing at the Hyannis Yacht Club house. By chapter 194 of the Acts of 1900 an appropriation of $12,500 was made for dredging a channel 6 feet deep at mean low water through the bay to the yacht club landing. This channel was excavated during that year, and by chapter 395 of the Acts of 1905 an appropriation of $3,000 was made for dredging a channel across the bar in the eastern end of the bay.

This latter work was advertised in connection with the project for the improvement of Witchmere harbor and Paskamansett River; and on Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company for excavating the channel, the contract price being 40 cents per cubic yard, the total amount to be paid not to exceed $3,000.

As the work progressed it was found that, owing to unauthorized changes in the United States bench marks, with reference to which surveys for estimates were made, the amount of material to be excavated largely exceeded the original estimates; and, in order to dredge the channel as required, it became necessary to excavate the additional amount of about 2,000 cubic yards, at an extra cost of $650.

The cost of this work when completed will be as follows: —

Excavation done by the dredging company, ...	$3,650 00
Surveys and superintendence, ...	90 94
Total, ...	$3,740 94

The total amount expended for the improvement of Lewis Bay to Dec. 1, 1905, is $13,319.72.

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Herring River.

By chapter 399 of the Acts of 1905 the Board was authorized to dredge the mouth of Herring River in the town of Harwich, to protect the same by jetties and otherwise improve the entrance.

An appropriation of $10,000 was made for carrying out the provisions of this act, it being provided that before the work was commenced the sum of $2,000 should be deposited with the Treasurer of the Commonwealth by the town of Harwich or its citizens, to be expended by the Board in addition to the $10,000 appropriated as aforesaid.

On June 16, 1905, the sum of $2,000 was deposited.

An examination was made of the mouth of the river in 1901, under the provisions of chapter 66 of the Resolves of that year, also a report and estimate of the cost of improving the same by dredging a new outlet 3 feet deep at mean low water, and protecting the same by stone jetties extending out to deep water in Nantucket Sound. The cost of this improvement was estimated from $35,300 to $59,100, the lower price being for timber jetties and the larger for stone jetties.

The appropriation made in 1905 being inadequate for carrying out the project as outlined, a survey was made to determine the changes which had taken place since the survey of 1901. It developed that the outlet had moved about 400 feet easterly, and that the entrance channel was much more difficult to navigate than in 1901. There had been no material change in the portion of the beach where it was proposed to create the new entrance in 1901, and plans were made for the construction of two stone jetties much shorter than those originally designed; for the excavation of a new channel through the beach, 75 feet wide on the bottom, to the level of mean low water; for riprapping its banks with stone; and for constructing an embankment or dike across the old outlet, so that the river would be turned into the new outlet through which it should scour a straight channel at least as large as the existing one.

The work, so far as planned, is of a permanent nature, and will prevent the mouth of the river from shifting in the

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future, and the jetties will prevent the waves from driving the sand into the mouth of the river. It will also enable the full force of the current to be utilized in enlarging and deepening the channel.

On July 27, 1905, a contract was entered into with Thomas & Connor, the lowest bidders, for building the jetties and excavating the channel, the contract price being $2.33 per ton for stone placed in the jetties and riprap, and $840 for the excavation of the channel through the beach to low-water mark. This work is now completed.

During the summer the old channel shifted quite materially, cutting into the beach on the easterly side of the entrance and also the high bluff further east. This created a low spot in the beach, over which the tide flowed at high water. In order to close this and turn the full volume of the tide through the new entrance, a low sand dike was built across this low spot, at an extra expense of $40. It is too early as yet to express an opinion as to how large an entrance channel will be created by the improvement, but the Board is satisfied that the availability of the river as a harbor for small boats will be materially enhanced.

The cost of work done during the year is as follows: —

For work under contract,	$11,141 02
For surveys, supervision and incidental expenses,	637 42
Total,	$11,778 44

The total amount expended at Herring River to Dec. 1, 1905, is $10,297.27.

Witchmere Harbor.

This harbor, located at Harwichport, was improved by the construction of jetties under authority of chapter 463 of the Acts of 1899, the total amount expended by the Commonwealth to Dec. 1, 1904, being $4,975.46.

By chapter 91 of the Resolves of 1904 the sum of $3,500 was appropriated for improving Witchmere harbor, by dredging the channel and in such other manner as may be deemed best; provided, however, that the town of Harwich or the

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citizens thereof should deposit not less than $500 with the Treasurer of the Commonwealth to complete the same.

A survey was made in June, 1904, and it was estimated that the cost of excavating the channel would be not less than $4,000. On Sept. 1, 1904, the Board was informed by the State Treasurer that $500 had been deposited with him by the town of Harwich under the above resolve.

The Board endeavored to make a contract for excavating the channel, but was unable to do so until it advertised the work in connection with the improvements at Lewis Bay and Paskamansett River, authorized by the Legislature of 1905. On Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company for dredging the entrance channel to this harbor, 40 feet wide, 5 feet deep at mean low water and about 1,150 feet long, for the sum of $3,825, the estimated amount of material to be excavated, *situ* measurement, being 10,000 cubic yards. This work was completed in a satisfactory manner, and in addition thereto the shoal within the harbor easterly of the westerly side line of the channel was also removed at an expense of $950, of which the Commonwealth paid $175 and the town the balance.

As sand was washing through between the large stones of the jetty on the westerly side of the entrance into the channel, arrangements were made for closing these interstices with concrete. Owing to the lateness of the season, this work could not be completed; but enough was done to close the openings through the lower portion of the jetty, through which the larger part of the sand was driven.

After the stone jetty was extended 150 feet in 1899, the beach to the westward built out to such an extent that large quantities of sea weed and some sand are constantly washing around the end of it into the channel. To prevent the continuance of this action, which will result in filling up and decreasing the depth of water in the channel, the stone jetty should be extended about 300 feet, substantially in the line of the portion built in 1899.

The cost of such an extension is estimated to be about $10,000.

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The cost of the work done during the year paid for by the Commonwealth is as follows: —

Excavating channel under contract,	$3,825 00
Extra dredging of shoal in harbor,	175 00
Work on stone jetty, and for advertising,	729 19
Total,	$4,729 19

The total amount expended for the improvement of this harbor to Dec. 1, 1905, is $8,823.96.

Bass River, Yarmouth.

In April a survey was made of the mouth of Bass River at Yarmouth. While considerable change had been made by the current during the past year, in general the depth and width of the channel had increased, so that the facilities for navigation were improved.

Owing to the scour of the current and the settling of the sand-bag embankment along the sides of the outer portion of the eastern jetty, that section of the jetty seemed to require a more substantial protection. On Dec. 1, 1904, a contract was made with Charles A. & Joseph J. Callahan to protect about 1,000 feet of the outer end with stone riprap. This work was completed Aug. 4, 1905, material to the amount of 1,838 tons having been deposited in place. The jetty is now protected in a thoroughly substantial manner from a level just above low-water mark to the bottom of the channel.

In addition to this work, about 50 tons of stone were placed at the inner end of the western jetty, to prevent the cutting away of the shore at the meeting point.

The cost of work done during the year is as follows: —

Stone riprap in eastern jetty,	$4,578 98
Riprap inner end of western jetty,	132 50
Supervision and incidental work,	373 07
Total,	$5,084 55

Of this amount, $5,034.62 was paid from the appropriation of $15,000 made by chapter 46 of the Resolves of 1903, and

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$49.93 from the appropriation for the survey and improvement of harbors.

The total amount expended in improving the entrance to this river to Dec. 1, 1905, is $37,129.68.

East Bay, Osterville.

Under authority of chapter 376 of the Acts of 1903 a channel was excavated through the beach from East Bay, located at Osterville in the town of Barnstable, to Nantucket Sound, two stone jetties built, the banks of the cut through the beach riprapped with stone, and the old outlet of the bay to the sound closed by a temporary dam, all at a total cost to Dec. 1, 1904, of $6,618.10.

The new channel opened in the spring of 1904 and the jetties protecting it are in good condition. A survey was made early in May and the depth on the bar was found to be nearly 3 feet at mean low tide. The sea had cut into the shore to the east of the easterly jetty to a dangerous extent, and was liable to break through the narrow beach. To meet the situation it is proposed to riprap this weak strip of the beach, about 150 feet, with stone taken from the outer end of the easterly jetty, at a cost of $250.

The flow of water through the old outlet, which broke down the temporary sand-bag dam built across it, has prevented the sea from closing up that mouth. But in order to close it in a substantial manner, so that all the current will flow through the new outlet, the Bay State Dredging Company is to build a sand embankment across it, for the sum of $600. The presence of a dredging machine in the vicinity enabled the Board to effect this arrangement at a low figure. This work will be done during the month of December, 1905.

No material change has taken place inside the bay, and the depth of water between the main portion thereof and the approach to the outlet is much less than in the outlet itself. It has, however, since construction saved many boats from shipwreck during several severe gales.

The total amount expended at East Bay to Dec. 1, 1905, is $6,649.52.

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West Bay, Osterville.

A survey was made of the channel through West Bay at Osterville during the spring, and it was found to be in good condition. The bar just inside the inner end of the jetties had been washed away to a considerable extent. There was a good depth of water in the channel on the easterly side of the bar and a fairly good depth on the westerly side.

It was stated that the westerly channel had been used quite extensively during the summer, and that, on the whole, the bar had offered but little obstruction to the use of the entrance.

Some of the planks in the jetties had become loosened, and were replaced and secured at an expense of $60.55.

The total amount expended at West Bay to Dec. 1, 1905, is $29,285.64.

New Bedford Harbor Line.

On Oct. 5, 1905, a petition was received from the Union Street Railway Company and the City Coal Company of New Bedford, asking the Board to take such action as will result in changing the harbor line in front of their wharves in New Bedford harbor, near the New Bedford and Fairhaven bridge.

Under the provisions of chapter 96 of the Revised Laws, section 14, the petitioners were ordered to publish notice of this application; and on Nov. 8, 1905, after due publication, a hearing was given, at which all parties interested had an opportunity to be heard. No one appeared in opposition.

The reasons advanced by the petitioners for the change in the present harbor line, which was established by chapter 269 of the Acts of 1848, were that the condition of the sea wall and foundation on the property of the street railway company requires that the same be rebuilt; that, owing to the deepening of the channel and berth in front of their wharves, and other changed conditions due to the construction of the Fairhaven bridge and other causes, it has become necessary to reconstruct the walls at the outer end of their wharves;

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that, owing to the narrow space between the outer ends of their wharves and the easterly ends of the large brick power houses on the wharf of the street railway company, it is practically impossible to reconstruct the walls within the existing harbor line; that, in order to make the necessary repairs without damage to their structures, the harbor line should be advanced from 8 to 10 feet.

From an examination of the locality it appears that formerly the main navigable channel of this portion of the harbor lay immediately in front of these wharves and between them and Fish Island, and over this channel the draw in the Fairhaven bridge was located. The space between the ends of the wharves and the island was too narrow to enable vessels to lie at the end of the wharves and leave a sufficient channel for navigation; consequently, it was decided at the time the bridge was rebuilt to place the draw eastward of Fish Island, a new navigable channel being dredged to conform to the new location of the draw. That portion of the bridge across the old channel having been built without a draw, the space in front of these wharves is now in the nature of a dock, there being no opportunity for vessels to pass up beyond these wharves.

The Board is of the opinion that there is sufficient reason for permitting the desired change in the harbor line, and that it will not interfere with public navigation.

While investigating this subject it was found that the harbor line immediately above the bridge might also be advanced, to conform to changed conditions and in substantial coincidence with the United States harbor line. The Board therefore reports this matter to the Legislature for action.

Paskamansett River.

By chapter 449 of the Acts of 1905 the Board was authorized to expend a sum not exceeding $2,000 in deepening and improving the entrance to Paskamansett River in the town of Dartmouth. A survey was made in June, 1905, and an examination of the locality made by the Board in July.

This river empties into a cove on the westerly side of Buz-

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zards Bay, between Mishaum Point and Barneys Joy Point. It has a channel 5 to 10 feet deep at mean low water, but its mouth is obstructed by a bar over which there is less than 3 feet at low tide. The beach to the southwest of the entrance is gradually working into the channel, and if a permanent improvement is to be created, a jetty should be built extending from this point in a southerly direction parallel with the general direction of the river channel.

The amount of the appropriation would not warrant the construction of such a jetty, but the dredging of a channel through the bar would give the immediate benefit desired. Consequently, it was decided to dredge across the bar in order to give passage between the bay and the deep channel in the river.

On Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company to dredge a channel 150 feet wide, 5 feet deep at mean low water and about 400 feet long, through the bar at the mouth of the river, the contract price being 48 cents per cubic yard, with the provision that the cost of the whole work should not exceed $2,000, the amount of the appropriation. Presumably this work will be done during the month of December.

The total amount expended in connection with this improvement to Dec. 1, 1905, is $92.15.

Nashawena Island.

At the request of the Governor and Council a survey and examination of the harbor at the island of Nashawena were undertaken, and a plan and estimate made of the cost of improving it sufficiently to make a safe and practicable landing for vessels, such as would be required in connection with the use of the island as a prison site.

The natural harbor runs nearly east and west, with an entrance into Buzzards Bay towards the north, and it is entirely feasible to dredge a channel at the mouth and an inside area of ample capacity to a depth of 12 feet at mean low water.

The approach to the harbor is deep, the water shoaling

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quite rapidly at the entrance. The present wharf appears to be located in a favorable place, and will be made accessible by the excavation of a channel 12 feet deep at mean low water, 150 feet wide and about 1,500 feet long; opposite the wharf the channel may be widened to 200 feet.

To more fully protect this basin a breakwater or jetty should be built, extending out from the headland on the eastern side of the harbor over the shoal or bar for a distance of about 750 feet. The bar at the present time is so high as to afford fairly good protection, but that can be materially increased by the construction of a breakwater.

There is ample stone on the island in the vicinity of the harbor to construct this breakwater, and it is work admirably adapted to furnish occupation to a large number of men with a minimum use of machinery.

The outer portion of the channel is through a bed of gravel and stone, which, once excavated, will probably be very little affected by the action of the waves; while the inner portion of the channel, where there is a large amount of soft material, will be so protected by the bar and breakwater that the waves will not injure it.

This channel will give free access to the most convenient landing place on the island, and will require the excavation, including side slopes on angles of 1 on 2, of 64,400 cubic yards. Its cost is estimated as follows: —

64,400 cubic yards, at 40 cents, ...	$25,760 00
Surveys and supervision, ...	1,000 00
Total, ...	$26,760 00

The present wharf should be extended to the edge of the proposed channel, and enlarged. This extension, if constructed of masonry, could also be done by hand labor.

For preliminary temporary use a small pile structure can be built at the end of the present wharf, at an expense not exceeding $500, including the repair of the top of the existing wharf. The construction of the breakwater and of the permanent wharf can be delayed for a time, and if the island is to be used as a prison site, they can be easily constructed by

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the labor of the convicts; and for this reason no estimate of their cost has been made.

Plans and estimates of the proposed harbor improvement were prepared and sent to the Governor on Nov. 1, 1905.

Cuttyhunk.

Under chapter 33 of the Resolves of 1900 the Board made surveys and estimates for improving the harbor of Cuttyhunk in the town of Gosnold. Three plans for the improvement of the harbor were made, one for improving the existing entrance channel by building jetties and dredging, and the other two for building jetties and cutting new entrances into Cuttyhunk Pond through the beaches at the north and east sides of the pond. The estimated cost varied from $29,550 to $116,500.

By chapter 450 of the Acts of 1905 an appropriation of $5,000 was made for dredging and otherwise improving the harbor. The appropriation being too small to fully carry out either of the schemes reported in 1900, a survey was made of the existing entrance, and a plan prepared for building two stone jetties, one on either side of the entrance, to direct and confine the current over the bar and prevent the waves from driving sand and shingle into the narrow channel opposite the point of the north beach. Both jetties are to start from the crest of the beach, and at that elevation to extend a short distance, the balance and outer portion of each jetty to extend only to the level of high water, with a mound at the end, rising about 4 feet above ordinary high water, for the purpose of marking the entrance.

It was estimated that jetties of this description could be built within the appropriation. Stone of a class suitable for this work is very abundant on the island and along the shores of the pond, from which it can readily be taken and used for the construction of the jetty. Most of the stone is owned by the Cuttyhunk Club, and on September 4 the assent of the club was obtained for the Commonwealth to take the stone and use it for the construction of the jetty, thereby enabling the Board to use the appropriation to the best advantage.

Proposals were invited, and on Sept. 28, 1905, a contract

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was entered into with Joseph J. Callahan, the lowest bidder, to build the jetties, the contract price being $1.08 per ton of 2,000 pounds, the work to be completed June 1, 1906. Owing to the late date at which the contract was made, and to the fact that the contractor was already engaged in building a timber dike for the Commonwealth at Stage harbor in Chatham, it was decided not to begin work at Cuttyhunk until spring, which would leave ample time to do the work within the contract limit. During the winter the contractor will build the scows and plant necessary for vigorously prosecuting the work in the spring.

The total amount expended in connection with this harbor to Dec. 1, 1905, is $458.88.

Vineyard Haven Harbor.

Under authority of chapter 95 of the Resolves of 1904 the Board last year reported on plans for the improvement of Vineyard Haven harbor, to provide safe anchorage ground for small yachts and boats. By chapter 442 of the Acts of 1905 the Board was directed to construct a stone breakwater on the westerly side of the harbor north of the steamboat wharf, within the appropriation of $10,000, which is about one-half the estimated cost of a breakwater 1,200 feet long.

In order to obtain the greatest protection with an expenditure limited to the amount of the appropriation, plans were prepared for a breakwater about 700 feet long in the shoalest part of the location recommended in the report of the previous year; and on Sept. 8, 1905, a contract was entered into with E. S. Belden & Sons for its construction, the contract price being $1.40 per ton of 2,000 pounds. The breakwater is to be located on the shoal ground on the westerly side of the harbor, about opposite Arnoux's wharf. It is to be between 600 and 700 feet long, 5 feet wide on top, and to project about 2 feet above ordinary high water, the outer face sloping on an angle of 1 on 1½, the slope of the inner face to be steeper. The anchorage basin will vary in depth from 4 to 8 feet at mean low water.

Owing to other work the contractor had on hand, construction will be delayed until spring, but it is to be wholly

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completed on or before June 1, 1906, the date named in the contract.

The total amount expended in connection with this harbor to Dec. 1, 1905, is $253.80.

Lake Anthony, Cottage City.

No work has been done at this harbor except the completion of the dredging which was in progress at the end of last year under the provisions of chapter 416 of the Acts of 1904. The jetties require some repairs, which will be made the coming spring by filling in spaces between the large stones with cement concrete, to prevent the sand from washing through them and shoaling the channel. This work has to be done from time to time, as new openings are caused by the settlement of the stones forming the jetties. The total expense of the dredging for the year was $5,654.87.

The mooring buoys set by the Commonwealth are in good condition, having been taken up and painted by the harbor master during the spring.

The use of the harbor is growing yearly as a place of refuge and for anchorage, and the area increased by the last dredging accommodates a large number of yachtsmen, sailing parties and fishermen.

The total amount expended at Lake Anthony to Dec. 1, 1905, is $36,172.95.

Nantucket Harbor.

By chapter 451 of the Acts of 1905 the Board was authorized to improve the harbor of Nantucket by dredging in the channel between Brant Point and Hussey shoal, $5,000 being appropriated for the purpose.

Early in July, 1905, an examination was made by the Board, and later a survey was made of the northerly end of Hussey shoal and the channel between it and Brant Point. A plan was adopted for dredging the northerly end of the shoal so as to increase the width of the channel where vessels entering the harbor were likely to be carried into shoal water by the strong tide, especially when missing stays in beating against a head wind.

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On Aug. 25, 1905, a contract was entered into with the Morris & Cumings Dredging Company, the lowest bidder, to dredge an area from the northwest end of the shoal about 400 feet long and 300 feet wide, to the depth of 12 feet at mean low water, for the sum of 28 cents per cubic yard. This work was completed Oct. 18, 1905, and in addition a small amount of material was excavated from the easterly side of the channel opposite Brant Point. The improvement of this channel is a great benefit to the harbor.

In all 16,732 cubic yards of material were removed, the cost of the same being as follows: —

Contract work,	$4,684 96
Surveys and incidental work,	163 89
Total,	$4,848 85

The total amount expended for the improvement of this harbor to Dec. 1, 1905, is $5,226.11.

Wrecks and Obstructions.

Complaints regarding wrecks have been received by the Board, and action thereon taken, with results as follows: —

Wreck of schooner "Albert Harding" at the entrance to Pigeon Cove harbor in Rockport. Removed by the United States government.

Schooner "Chromo" wrecked at the entrance to Boston harbor, off Boston light. Removed by the United States government.

Sloop yacht "Gooshkeen" in Pleasure Bay at City Point, South Boston. Removed by the owner.

Wreck of schooner "Annie E. Lane" in Beverly harbor, near the draw of the Salem-Beverly bridge. Removed by the Board and sold to William M. Swasey of Salem. The net cost to the Commonwealth will be $225.

House boat "Charles McDonald" in Beverly harbor. Removed by the owner.

Wreck of small schooner in the channel of Quisset harbor in Falmouth. Removed by the Board at an expense of $25.

The total amount expended from the appropriation of $1,000 made by chapter 38 of the Acts of 1905, to Dec. 1, 1905, is $25.

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Fall River–Somerset Bridge.

The Railroad Commissioners, the Harbor and Land Commissioners and the County Commissioners of the county of Bristol were constituted a Joint Board by chapter 462 of the Acts of 1903, and directed to locate and construct a new drawbridge over Taunton Great River, between the city of Fall River and the town of Somerset, with the necessary approaches and ways thereto, at a cost not to exceed $1,000,000.

As stated in the report for 1904, page 76, plans for a bridge with a lift draw, having a clear passageway of 70 feet, to be located about 1,200 feet north of the existing Slades Ferry bridge, with the easterly terminus at Brightman Street in Fall River, were approved by this Board on May 2, 1904, and application made by the Joint Board to the Secretary of War for his approval of these plans.

A favorable report on the plans presented was made by the United States engineer officer in charge of the district where the bridge is to be built; but before final action upon the matter, at the instance of certain remonstrants, a special Board of three engineer officers was appointed by the Secretary of War to further investigate and report upon this project. They gave a public hearing in Fall River on April 14, 1905, at which members of the Joint Board and others, in favor, as well as those in opposition to the original plans submitted, were heard at length.

The report of this special Board was unfavorable, and notice was subsequently received from the acting Secretary of War that these plans failed to meet with approval.

A request will be made for a further hearing before the Secretary of War, asking for reconsideration of the subject, the Joint Board being unanimously of the opinion that the original site selected is the one where the bridge should be built, for the reasons following, to wit: that it will cost less; that it will afford the greatest convenience to the largest number of the public travelling on the highway and prevent the least obstruction to navigation, at the same time avoiding any curtailment of the harbor or interfering with

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the use of shore front adapted for wharves and docks. By this is meant that, balancing the several conveniences of the public travelling by land and the public using the water way, the site selected would be the least objectionable. If located above, its usefulness would be greatly impaired; if below, it would cost more and interfere with future water front development. The chief objection urged seems to be its inconvenience, or, as the remonstrants say, its danger to tows. This can be wholly obviated by limiting the tows to three vessels, and shortening up the tow lines.

Great Ponds.

By chapter 318 of the Acts of 1888 the Board was given jurisdiction over great ponds containing in their natural state more than 10 acres of land.

Numerous licenses have been granted from time to time, since the passage of this act, for the erection of structures and for building flumes and drawing water from great ponds for use in flowing cranberry bogs. The right of the Board to revoke a license for drawing water from a great pond containing a clause providing for its revocation in case certain conditions are not complied with, has recently been questioned, and the opinion of the Attorney-General has been requested.

It was stated in the report of the Board for 1902, page 46, that the Attorney-General had been requested to make claim to an island known as Loon or Snake Island in Chebacco Pond in Hamilton, believed to be occupied under claim of squatter right only, and that the matter was pending in his office. The Board was informed on Sept. 25, 1905, that the auditor before whom the case was tried had rendered a decision adverse to the Commonwealth, on the ground that, the town of Ipswich having been settled before 1647, and having at the time of its settlement become vested with the title to the lands and ponds within its limits, the effect of the ordinance of 1647, so far as great ponds were concerned, was merely to secure certain rights of enjoyment to the public, but not to take from the town the legal title. From which it appears that the substantial question to be decided is,

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whether the Commonwealth, as against an unlawful intruder, does or does not own an island in a great pond where there is nothing to defeat the title of the Commonwealth to the pond except the fact that it is situated within the limits of the town established and recognized by the colony before the passage of the colony ordinance of 1641–47.

The matter is pending before the Supreme Judicial Court on questions of law to be argued at the November sitting of the court.

Province Lands.

The reclamation of the territory belonging to the Commonwealth known as the Province Lands, located in Provincetown and containing about 3,290 acres, has been in progress under the direction of the Board since 1893. The method adopted for this work is the planting of beach grass, shrubs and trees to cover and hold the blowing sands, and has been fully described in previous reports of the Board.

By chapter 396 of the Acts of 1905 a further appropriation of $10,000 for the reclamation of these lands was made, one-third of the same to be expended in each of the three years after the passage of the act. About 270 acres have been covered with beach grass since the commencement of work of that character in the spring of 1895, leaving about 45 acres of barren sand dunes yet to be covered.

A road across this property to Race Point life-saving station, 10,200 feet in length, has been built under previous appropriations, at an expense of $3,450.

The sum of $142.52 has been received during the year from licenses which have been issued to various parties to cultivate and pick cranberry bogs on these lands.

The report of the superintendent of these lands may be found in the appendix.* The Department of Agriculture at Washington continues its interest in the reclamation of the sand barrens on the Cape.

The amount expended during the year was $3,430.64.

The total expenditure on these lands to Dec. 1, 1905, is $38,647.84.

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* See Appendix B.

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Taxation of Forest Lands.

On May 15, 1905, the provisions of chapter 60 of the Resolves of 1905, relating to the appointment of a committee to consider the laws relative to the taxation of forest lands, were considered, and the chairman of this Board was chosen to act as a member of said committee.

Fall River.

In July, 1905, the Board, acting under authority of chapter 471 of the Acts of 1905, and with the approval of the Governor and Council, executed a deed to the Old Colony Street Railway Company of tide-water land in Mount Hope Bay in Fall River, described in License No. 2773, granted by the Board to said company July 29, 1903. The consideration named in the deed was $100, being in addition to the sum of $2,000 paid into the treasury of the Commonwealth by said company for rights and privileges granted in tide-water land of the Commonwealth by said license.

State Boundaries.

For the purpose of preserving and maintaining the monuments and marks on the State boundary lines, section 4 of chapter 1 of the Revised Laws requires that the Board of Harbor and Land Commissioners shall in the year 1905 and every fifth year thereafter examine and inspect all the monuments or other marks defining the location of the boundary lines of the Commonwealth; and if any of them have been injured, displaced, removed or lost, said commissioners shall, in co-operation with persons duly authorized by the adjoining State, restore them or replace them with suitable stone monuments, and in the same manner set suitable stone monuments at points not properly marked, where the State boundary is intersected by the boundary of any counties, cities or towns in the Commonwealth, or by a highway or railroad.

In order to defray the expense to be incurred in the performance of the foregoing duty, an appropriation of $1,500 was made by the last Legislature.

The Board, by correspondence with the executive depart-

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ments of the several adjoining States, arranged for a perambulation of the State boundaries with New Hampshire, Vermont and Connecticut. The State of Rhode Island failed to respond to the invitation. The State of New York perambulated its boundary line in 1902.

The result of the performance of the duties required by the statute is reported as follows: —

Boundary Line between Massachusetts and New Hampshire.

The boundary line between these two States remained unsettled for more than two hundred years. As long ago as 1693 efforts were made to fix the boundary line, but without success. Commissioners were appointed at various times in the eighteenth century, without being able to reach any agreement.

In the year 1740 the King in council ordered and adjudged "That the Northern Boundaries of the province of the Massachusetts Bay are and be a similar curved line Pursuing the course of the Merrimack River, at three miles distance, on the north side thereof, beginning at the Atlantic Ocean and ending at a point due north of a place in the plan returned by the said Commissioners, called Pawtucket Falls, and a strait line drawn from thence due west across the said river till it meets with His Majestys other Governments. . . ."

In March, 1741, George Mitchell was appointed to run the "similar curved line" from the ocean to the point north of Pawtucket Falls, and Richard Hazen to run the straight line due west. They both started from a pitch pine tree nearly 3 miles north of Pawtucket Falls, now Lowell, and thereafterwards known in the many commissioners' reports as the "Boundary Pine."

Far from settling the boundary, the result of this action created great dissatisfaction, and the many efforts to agree upon the line run by Mitchell and Hazen as the true boundary failed, until in 1885 commissioners were appointed by both States to jointly ascertain and re-mark the line as defined in 1740–41.

From the "Boundary Pine" at Lowell eastward to the

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sea these joint commissioners found monuments which they identified as marking the angles originally located in 1741, and ran lines connecting them.

From Lowell westward they agreed that the nearest approach to the line as originally run out was a series of straight lines connecting the existing town corner bounds, and so marked the line.

The boundary thus ascertained was established by the Legislature of Massachusetts, chapter 369 of the Acts of 1899; and by the Legislature of New Hampshire, chapter 115 of the Acts of 1901.

For the history of this boundary line see report of Commissioners to ascertain and establish the Boundary Line between Massachusetts and New Hampshire, Mass. House Doc. No. 490, 1889, and House Doc. No. 860, 1899; also, Bulletin No. 226 of the United States Geological Survey, upon boundaries of the United States and of the several States and Territories, 1904.

In September, 1905, authorized representatives of Massachusetts and New Hampshire met by appointment, and perambulated the boundary line between the two States. All the bounds were found to be in place and in good condition except No. 117, at the turnpike called Broadway, in Methuen. This bound apparently was not set deep enough, and was thrown out of plumb so as to lean about 12 inches from the vertical. Also, No. 132, at Hilldale Avenue, Haverhill, was in a similar condition, although at present it leans only about 5 inches out of the perpendicular.

These monuments have now been severally reset in their respective identical locations.

Boundary Line between Massachusetts and Vermont.

The boundary line between the Commonwealth and Vermont is a continuation of the line between New Hampshire and Massachusetts, which was run by Richard Hazen in 1741 from "Boundary Pine" on the New Hampshire line through to the Hudson River, and no contention has ever arisen as to its location.

The line, however, remained unmarked by monuments

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until the twentieth century, when, after a preliminary survey of the line between the northwest corner of Massachusetts and the Connecticut River, made to determine the relative position of the town corners and fences connecting the line of occupation between the States and such other monuments or points as might be used in aiding a final agreement, monuments were set and marked by commissioners representing both States as on the New Hampshire line.

The line was finally established by the Legislature of Massachusetts, chapter 131 of the Acts of 1900; and by the Legislature of Vermont, chapter 137 of the Acts of 1900.

For a history of this line see Mass. House Doc. No. 300, 1900.

A perambulation of this line was made in October, 1905, by authorized representatives of the Commonwealth and the State of Vermont, who duly met at an appointed time and place, and together visited and examined the monuments. All the bounds were found to be in place and in good condition, with the following exceptions: No. 9, at the corner of Bernardston, Guilford and Leyden, is very loosely set and easily shaken. It stands in swampy ground, and is liable to be forced further out of place. No. 31, at Jilson Hill, between the towns of Rowe and Whitingham, leans about 7 inches from the perpendicular toward the west and south. There are deep holes in the ground around the base of the monument, and it is liable to fall over still further. The ground around this monument is also soft and springy.

These monuments will be severally reset in their identical locations.

Boundary Line between Massachusetts and Rhode Island.

The charter of New Plymouth was obtained in 1629. Although it gave the colonists the highest prerogatives of sovereignty, yet, as it was not confirmed by the Crown, it failed to become a duly incorporated body politic, and so remained until 1691, when it was united with the Colony of Massachusetts.

Meantime, in 1663 a royal charter was granted to Rhode Island, which, encroaching upon the Plymouth patent, gave

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rise to disputes relative to the boundary line between Rhode Island and Massachusetts, which were not settled for over two hundred years.

Many commissioners were appointed and many reports made, and twice the differences were carried to the Supreme Court of the United States during this period of controversy.

The history of the differences and final settlement may be found in Mass. House Doc. No. 102 for the year 1861; in Sen. Doc. No. 34 for the year 1883; in the report of the Commissioners on the Topographical Survey, House Doc. No. 1230 for the year 1899; and in Bulletin No. 226 of the United States Geological Survey, 1904.

It is sufficient for the purpose of this report to say that the boundary line from Burnt Swamp corner west to the Connecticut line was finally established by Massachusetts, chapter 154 of the Acts of 1883, and Rhode Island, chapter 342 of the Acts of 1883; and that the boundary line between the Commonwealth and the State of Rhode Island from Burnt Swamp corner southerly to the sea was established by Massachusetts, chapter 476 of the Acts of 1899, and Rhode Island, chapter 683 of the Acts of 1899.

The whole of this boundary line has been delineated and fully marked by bounds and granite monuments. It has been perambulated by an authorized representative of the Commonwealth, not, however, in conjunction with an agent of the State of Rhode Island, as, although invited, none was appointed to pursue the work jointly.

All the marks along the eastern boundary of Rhode Island are in good condition except six. Two of these, Nos. 74 and 75, stand in meadow land near the banks of Runnins River, between East Providence and Seekonk. They are line stones, and are valuable as reference marks to the angle in Runnins River, where the line bends from a straight line and follows the middle of the river. The angle point is marked by an iron bolt set in the stones of the bridge, and will be destroyed whenever the bridge is rebuilt. The two stones are about 300 and 600 feet from the bridge, and at present are so loose that they can be easily shaken. These stones will be permanently reset in concrete.

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Nos. 97 and 98, in the line between Swansea and Warren, stand on the north and south sides of the New York, New Haven & Hartford Railroad. The railroad at this point crosses a meadow on quite a high embankment, and the monuments stand substantially on the two edges of the railroad location in the swampy ground. These stones will be reset so as to be firmly fixed.

No. 101, between Swansea and Warren, is a short distance north of the shore of Mount Hope Bay. It is a small stone, and is practically a reference bound to the large stone which stands on the shore just above high-water mark. At the present time it is loosely set, and leans 7 inches to the south. It will be permanently reset in concrete.

No. 104, between Fall River and Tiverton, on the easterly side of the location of the Newport branch of the New York, New Haven & Hartford Railroad, at the present time is entirely out of the ground, leaning against the bank on the southerly side of State Avenue, a street which follows the boundary line between Massachusetts and Rhode Island at this point. When the line was re-marked in 1898 the bound stood on the top of the bank, and is one of the original bounds which was not disturbed. Since that time the bound has apparently been undermined by the gradual wearing away of the embankment by the water which runs down that side of the ditch from the roadway. It will be reset at a lower grade in the identical location, substantially level with the surface of the present roadway.

Of the monuments marking the northern line of Rhode Island, all were in good condition except as follows: —

No. 26, which marks one of the angles of the line, is buried below the surface, and a new bound is placed on the opposite side of the street; undoubtedly the old bound can be dug up at any time when it is necessary to establish the exact location of the angle. The old bound, which originally projected above the surface, was probably broken off in order not to interfere with adjacent property.

Twelve of the bounds along the line, none of which are at angles, are almost wholly buried in the ground, and are difficult in most cases to find. Larger bounds, which would pro-

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ject 4 feet above the surface, will at some future date, in co-operation with the State of Rhode Island, be set alongside these small ones, so that the marks can be more readily found.

Boundary Line between Massachusetts and Connecticut.

The boundary between the province of Massachusetts and the colony of Connecticut has presented questions of conflicting interest from the settlement of the country down to a late date. After many efforts in the seventeenth century, and failure to reach agreements, memorials were forwarded to the King, asking the Crown to settle the disputed boundaries. Without, however, awaiting the action of the Crown, commissioners on the part of the two colonies were appointed in 1713, and made a report in 1714, which was accepted. Subsequently in 1734 a perambulating committee discovered that a mistake at the northwest corner of Woodstock had apparently been made in 1713. The discovery of this mistake caused endless misunderstandings and disagreements, which continued through the eighteenth century. An amicable settlement, however, was finally reached in 1826, when a report was agreed to by both States, and the long-continued controversy was terminated. (Resolves of Massachusetts, 1824–1828, p. 544; chapter 102, Resolves of 1803–04, line west of Connecticut River; Private Laws of Connecticut, Vol. 2, pp. 1540–1544, 1544–1550.)

The line is the original southerly line of the territory granted by the Council at Plymouth to Sir Henry Roswell and others in the third year of the reign of King Charles the First. This grant was afterwards confirmed by the King, and was described as "all the lands lying within the space of three English miles on the south part of Charles River or any and every part thereof."

In 1642 Massachusetts employed Messrs. Woodward and Saffrey to run out the line, but Connecticut did not join in this work, and afterwards disputed it. The line they ran was intended to be a straight line running due west from a point 3 miles due south of the most southern portion of Charles River.

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The charter granted to the Colony of Connecticut in 1662 bounds it on the north by the Massachusetts line.

In 1695 Connecticut had the line run out by Messrs. Butcher and Whitney. They began and ran a line supposed to be the same as the Woodward and Saffrey line, but it came out farther north.

In 1713 commissioners were appointed from both States to agree on and mark the line; and Feb. 13, 1714, they reported on the portion of the line east of the Connecticut River, and June 15 in the same year on the portion west of the river. By this agreement Massachusetts was to have the border towns of Enfield, Suffield and Woodstock, which had been settled by Massachusetts, but were located just south of the straight line; and in compensation therefor Connecticut was granted a tract of nearly 108,000 acres, which she sold, and the proceeds were given to Yale College.

The line was perambulated by both States in 1734; but many of the inhabitants of the border towns south of the line desired to belong to Connecticut, although against the protest of Massachusetts.

The matter continued in dispute until in 1749 the Legislature of Connecticut passed a resolution that, inasmuch as the line had not been approved by the King, and that the two colonies had no legal right to transfer territory without the confirmation of the Crown, the contract was void, and these towns were again taken under the jurisdiction of Connecticut. Massachusetts appealed to the King, but the claims of Connecticut were allowed.

Massachusetts was still dissatisfied, and in 1791 commissioners were appointed by both States to locate and mark the line, the commissioners from Connecticut, however, being limited to the establishment of the line west of the Connecticut River. But these commissioners were unable to effect any agreement, and so reported in 1802. The possession of the border towns still continued to be the subject of their differences.

The Massachusetts Legislature of 1802 requested the Governor to propose a compromise to the Governor of Con-

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necticut; and in 1803, the same having been accepted, commissioners from both States were appointed to complete the running out and re-marking the boundary line in accordance therewith.

The act appointing the commissioners provided that the line as marked by them should be the boundary line; but their joint report was confined to the line west of the Connecticut River, reciting, however, that they knew of no dispute regarding the line to the eastward. (See chapter 102 of Massachusetts Resolves of 1803, dated Feb. 18, 1804.)

The portion east of the Connecticut River remained unidentified until 1825, when the Governor was authorized to appoint commissioners for ascertaining and establishing this portion of the line, which, when defined, was forever afterwards to be the true boundary line between the two States.

The joint report of the commissioners was made to Massachusetts, and ordered by the Legislature in 1827 to be deposited and recorded in the Secretary's office, and to be printed with the Resolves of that year.

And from that time no dispute or misunderstanding has ever arisen as to the true boundary line between the two States.

The line, however, has not been surveyed since it was originally laid out and marked westerly from the Connecticut River in 1803 and easterly therefrom in 1826.

In 1899 the Massachusetts Topographical Survey Commissioners reported to the Legislature (Pub. Doc. No. 50) that a preliminary examination of a greater part of the line had been made, and it was found to be in an unsatisfactory condition. As to the portion east of the Connecticut River, while most of the angles named in the 1826 survey were marked, many of the monuments were found to be defaced and broken, and others not upright; the bounds were not of uniform size, not properly marked, and 75 points required new bounds.

The portion of the line west of the Connecticut River was in a far worse condition, and over 50 per cent. of the bounds at the highways were missing.

They reported that the whole line should be surveyed, and the location of all corners and summits determined by trian-

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gulation; the position of road stones should be tested, and the stones replaced on the line wherever wrongly put; that 130 granite monuments should be set, and 45 old ones reset, at an estimated cost of $14,000, or $7,000 for each State.

In the following year the entire line was perambulated, all the existing bounds and marks photographed, and a report of dimensions, descriptions and locations, together with special remarks, was made for the purpose of gaining a complete record of the situation.

In the year 1905 the Legislatures of Massachusetts and Connecticut severally appropriated the sum of $7,000 to cover the expense of rehabilitating the boundary line. This Board and the Connecticut Commissioners have met and made arrangements for perambulating the line, restoring and replacing all defaced and broken monuments, and adding such new ones as may be deemed necessary. When this work shall have been completed, the line may be perambulated once in five years, as required by the statutes, and the monuments preserved at comparatively slight expense.

Boundary Line between Massachusetts and New York.

From the days of the colonial charters the State boundary line between Massachusetts and New York seems to have been involved in entanglement and controversy. In this report, however, it would not be profitable to inquire into its history prior to the year 1773, when the action then taken appears, from the annual report of the State Engineer and Surveyor of the State of New York for the fiscal year ending Sept. 30, 1899 (page 200), to have been as follows: —

By act of the New York Assembly, passed March 8, 1773, "Commissaries" were appointed "to settle a Line or Lines of Jurisdiction, between this colony and the Province of the Massachusetts Bay." Commissioners with like powers having been appointed by Massachusetts, the joint commission met at Hartford, where it was unanimously agreed that "a line beginning at a place fixed upon by the two governments of New-York and Connecticut, in or about the year of our Lord one thousand seven hundred and thirty-one, for the northwest corner of a tract of land commonly called the Oblong, or equivalent land; and running from the said corner north twenty-one degrees, ten

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minutes and thirty seconds east, as the magnetic needle now points, to the north line of the Massachusetts Bay, shall at all times hereafter be the line of jurisdiction between the said province of the Massachusetts Bay and the said province of New-York, on its eastern boundary, shall adjoin the said province of the Massachusetts Bay."

The course north twenty-one degrees, ten minutes and thirty seconds east, is the general course of the Hudson River, as determined by survey in the winter of 1772.

From this it is obvious that the westerly boundary of Massachusetts was intended to be a straight line from beginning to end.

Owing to a disagreement of the commissioners, the line was then run no more than 20 miles. In 1784 both States requested Congress to appoint commissioners to carry out the agreement of 1773. In 1787 commissioners appointed by Congress met at the south end of the line, and, finding that a line run under the agreement would describe a curve, reported as follows, viz.: —

> Your commissioners afterwards, in order to save time, trouble and expense, proposed, instead of such a curve, to run a straight line or great circle of the globe — that is, to give equal tracts of country to each State that the curve would have done. . . . The equivalent line was found to be 11′ 40″ more westerly than the curve at the place of beginning — that is 15° 2′ 9″ east of the true meridian, which direction we carefully ascertained by many astronomical observations and afterwards pursued the same . . . to the northern boundary of the State of Massachusetts.

The line thus determined was accepted by both States as the jurisdictional line, and remained in force in its entirety until the cession of the Boston Corner tract was made.

It was marked by stone heaps, stakes and crosses cut in rocks.

Boston Corner, so called, at the south end of the line, embracing 1,010 acres, was set off and ceded to the State of New York in 1853, accepted by New York and subsequently ratified by act of Congress Jan. 3, 1855. Because of the substantial size of area ceded, it was doubtless thought an act of Congress was desirable, in order to avoid the possible inference that it might affect a political division of the country.

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In the annual report of the State Engineer and Surveyor of New York for the year 1903, on page 86, he says this line "was re-established in 1897, 1898 and 1899 by officers of the State of New York and of the Commonwealth of Massachusetts, and during these years was marked by 121 monuments, of which number 83 are granite and 38 iron."

In the report of the Massachusetts Topographical Survey Commission, House Doc. No. 1100 [1900], page 4, it is said that: —

The principle on which the present boundary was founded was proclaimed in 1664. In that year the royal commission which had been sent out to visit various colonies in New England, and which had been given, among other duties, that of determining the boundaries between different colonies in disputed cases, declared the western boundary of Massachusetts to be a straight line 20 miles easterly from the Hudson River, and parallel with its general direction in this latitude. The location of the southerly end of the line appears to have been generally agreed to, but the direction of the line was the cause of much dispute.

On page 8 it is said: —

The only change in this line since 1787 is that authorized by chapter 340 of the Acts of 1853, and ratified by Congress Jan. 3, 1855, by which the southwesterly corner of Massachusetts, known as "Boston Corner," and containing 1,010 acres, was ceded to the State of New York, in order to insure adequate police protection to territory which was the scene of much lawlessness. Plans of this "Corner" are on file in the State departments at Boston and Albany.

On page 9 it appears that in 1887 the line was run by the New York State Engineer and Surveyor, and but few marks were found which could be identified.

In 1836 Simeon Borden, an eminent surveyor, who was then employed by the Commonwealth to make a map of Massachusetts, not finding any monument to mark the boundary line at the junction of Massachusetts, Vermont and New York, placed a marble monument on the spot where he thought the true bounds of these three States conjoined.

It would be impossible for the Borden bound to co-exist in conjunction with other well-defined and accurately established and agreed monuments, and form a straight line.

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In 1892, by chapter 678 of the Acts of that year, New York established and defined all her boundary lines; and the State Engineer and Surveyor was directed every third year to examine all the monuments marking the State boundaries, and to replace or repair any lost or injured bounds, in co-operation with the representatives of adjoining States. In section 3 of said act the line is described as running from a marble post at Boston Corner marked on the east side M S, on the west side N Y and on the south side 1853; "thence along the line as the same was laid out by the United States Commissioners in 1787, north 15° 12′ 9″ east, 47 miles 73.81 chains, to a marble post marking the junction of the New York and Massachusetts line with the southern line of Vermont." To run a straight line, passing through well-identified monuments, and terminate at the Borden monument, would be impossible; either the straight line would have to disregard established monuments, or deviate at some point. The joint State survey hereinafter cited discovered the deviation.

In 1899 the Massachusetts Topographical Survey Commission and the New York State Engineer and Surveyor, acting jointly under the authority of legislative enactments of their respective States, re-covered and re-marked the old line of 1787. In so doing they discovered that the stone marking the northwest corner of Massachusetts was located 58 feet east of the true line; whereupon, with the concurrence of the Vermont Commissioners and the Massachusetts special commission appointed to act concurrently with the Vermont Commissioners in re-marking the boundary line between the States of Vermont and Massachusetts, the Massachusetts Topographical Survey Commission and the State Engineer of New York moved and set the stone on the spot agreed by all four bodies to be the true point of intersection of the boundary lines of the States of Massachusetts, Vermont and New York.

The extreme care and accuracy with which this work was done is shown in the report of the Massachusetts Topographical Survey Commission for the year 1899. From pages 10 and 11 of that report the following is quoted: —

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The line is straight for a distance of 47.2 miles. The difficulties incident to developing a perfectly straight line of this length upon the ground can only be known by those who have undertaken a similar task. A preliminary study showed that points that were supposed to be nearly on the line in 1787 could not be identified; it was therefore determined to adopt for the preliminary survey a base line which would represent as nearly as possible an average of the old stone piles and other marks already found. By running out this average line with the greatest possible accuracy, and connecting it with all the marks that could be found along its length, it was anticipated that some more favorable line could be found to represent the permanent line. To do this involved the selection of a point on Mount Misery opposite an old 1787 transit post, and far enough east, as shown by recent survey, to make the line follow the average line of stone piles at this northerly part of the line. Here a tripod signal was erected, and heliotrope flashes sent down the line toward Alandar Mountain, on which a point was selected that represented the average of the marks in this vicinity. This point was used as an instrument station for sighting to the flash on Mount Misery as a foresight, a distance of 37.9 miles; and, with the aid of the line thus established, a point was fixed on Mount Harvey, situated 16.3 miles north of Alandar. With these three points well set in line, other points were interpolated by the usual methods, and the straight line prolonged north of Mount Misery by transiting a distance of about 10 miles.

This base line was measured, and a rough profile taken. The points on the summits thus carefully established in line with each other were then connected with stations in the State primary system of triangulation by Mr. James B. Tolley, and their geodetic positions computed, to check both the alignment and the measurement. The result shows the base line work to be in good accord with the triangulation, and the azimuth of the line agrees within 13″ with that determined over one hundred years ago with cruder instruments and methods. Upon the completion of the survey it was found that this line had been run with so much care and was so near the probable line adopted in 1787 that it was difficult to determine how it could be materially improved. Near the southern extremity it was 1.9 feet east of the middle point between the M and N Y marks on the ledge on Alandar Mountain, and 1.8 feet west of the chiseled arrow between the M and N Y cut on the ledge at Mount Prospect a few miles further north. Near the northern extremity of the line it was a few feet east of the stone pile on Mount Misery, supposed to be the twelfth transit post of 1787, and a few feet west of the stone pile on Berlin Mountain, supposed to be the fifteenth transit post, and it passed directly through the stone pile on

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Rhodes Pinnacle, known to be the fourteenth transit post. It also passed through or close to several other well-identified old boundary marks. A wide divergence of about 58 feet to the east at the northern extremity of the line was disclosed by the survey. This divergence occurred in the last three-quarters of a mile, due, perhaps, to some error in the old survey in running by compass down the steep slope of Jim Smith Hill. Finally, the line determined with so much care was adopted; and, at a conference between the State Engineer and Surveyor of New York and this commission, the following agreement, providing for the setting of the bounds, was made.

Again, from page 13: —

Forty-seven new granite monuments 12 inches square and 9 feet long, 36 new granite monuments 12 inches square and 5 feet long, and 26 new cast-iron posts 5 feet long, set in concrete masonry, have been placed to mark the line; and 1 old road stone and 2 stone bounds at town corners have been re-set on the line.

The bound at the northwest corner of the State, set in 1896 by special commissioners of Massachusetts and Vermont, was found to be 58 feet too far to the east. By the consent of these commissioners this bound was moved westerly along the northerly boundary line produced, 58 feet to the point of intersection of the westerly and northerly lines, as now defined and marked.

Also, from page 14: —

Finally, acting with the officers or agents duly authorized by the State of New York, we have located, defined and marked the true line between the territory under the jurisdiction of the Commonwealth of Massachusetts and that under the jurisdiction of the State of New York.

A record plan, including a profile of the line, has been prepared, showing the location of all the monuments, town corners and road crossings, which, with five other plans and a description of the line, have been approved by the authorized agents of the two States, and filed with the Secretary of the Commonwealth.

In 1901, by chapter 374, the Legislature of Massachusetts passed an act establishing the boundary between the Commonwealth and the State of New York on the line which terminated at the northwest corner of the State in the bound heretofore referred to as set by the four representative bodies in 1899; and provided that the same should take effect on

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the first day of September in the year 1901, or as soon thereafter as a similar act passed by the State of New York, establishing the line described in this act, shall take effect. The draft of a similar act was reported by the State Engineer and Surveyor to the New York Legislature, but has not as yet been enacted into a law.

Ratification by Congress.

It having been questioned as to whether or not an act of Congress ratifying the action of States in delineating a common boundary line were essential to the validity of the jurisdiction so determined, and inasmuch as the States bordering on Massachusetts at different times concurrently with her had straightened lines, replaced monuments and made some slight alterations in their boundaries without inviting the confirmation of Congress, it would seem appropriate to state the law as determined by the Supreme Court at Washington, interpreting the meaning of that clause in the Constitution upon which the doubt seems to be founded.

The Constitution, in article 1, section 10, provides that no State shall without the consent of Congress enter into any agreement or compact with another State. Through a series of decisions of the Supreme Court this provision has come to be interpreted as meaning, not that there are no matters upon which States may make agreements, but that such agreements as may be made shall not affect the political integrity of the several States, or have a tendency to change their relationship to the United States.

Therefore, it would seem that an agreement or compact between two States, which, in establishing a boundary line, set over or interchanged inconsiderable areas for the purpose of straightening or more clearly indicating the same, the effect of which bore upon property rights only, and had no tendency to change the power or political relationship already existing between the States themselves or in their relationship to the United States, would not be repugnant to the Constitution or require the confirmation of Congress.

All changes made in establishing the boundaries of the Commonwealth are well within this rule except the ceding

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of 1,010 acres at Boston Corner to New York in 1853, in confirmation of which Congress enacted a law.

The Board recommends legislation relative to the removal or alteration of State boundary monuments, and will submit a draft of an act to accomplish that purpose.

Town Boundary Survey.

The work of determining the location of town boundaries has continued with the same organization as for the past few years. Two field parties were engaged on it from early in May to the middle of November. Previous to the latter date the field work necessary to mark the location of the new corners established on the boundary lines between Hamilton and Ipswich, Sandwich and Mashpee and Plainville and Wrentham had been done.

The permanent members of the field force have been engaged during the winter in plotting the results of the previous season's work, and preparing the data necessary for use in the field work of the next year.

One field party was engaged in the location of bounds of a series of 16 cities and towns in the southern portion of Worcester County, and the survey of the rivers and roads forming portions of these boundaries. The other party was engaged in determining the boundaries of two groups of towns in the northern part of Middlesex County, including the survey of streams and roads forming portions of the boundaries of these towns. In all, the two parties determined by triangulation the location of 239 bounds marking the angles in town lines, and made surveys of a little more than 20 miles of streams, roads and shore lines of ponds.

In the prosecution of the work a number of boundary lines were found to be very crooked, and in certain cases the town officers expressed a wish that they might be straightened; consequently, after consultation with the officers, the Board submitted to these towns for their concurrence plans for changing and straightening portions of the boundary lines between them. Five of the towns, viz., Hamilton, Wenham, Leominster, Paxton and Holden, assented to the proposed changes, but the town of Lancaster declined to concur.

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In the case of the boundary lines established by the Legislature of 1905, the Board has caused its engineers to set stakes at the new corners, and later the necessary stone monuments were set by the town officers.

The office force has been employed in computing the positions of town corners and triangulation stations whose positions were determined by the field parties the previous season; in making abstracts from the statutes relating to the establishment of the town boundaries; and preparing the results of the work for permanent record. The examination of the early court records for information in regard to the establishment of these boundaries has been completed, and the indexing of the field notes has been well advanced.

Three new atlases, describing the boundary lines of forty cities and towns, viz., Newton, Dedham, Dover, Needham, Wellesley, Westwood, Foxborough, Medfield, Norwood, Sharon, Walpole, Ashland, Framingham, Bellingham, Franklin, Holliston, Medway, Millis, Natick, Norfolk, Plainville, Sherborn, Wrentham, Gloucester, Newburyport, Amesbury, Essex, Georgetown, Groveland, Hamilton, Ipswich, Manchester, Merrimac, Newbury, Rockport, Rowley, Salisbury, Topsfield, Wenham and West Newbury, have been distributed during the year.

Another atlas, describing the boundaries of 11 cities and towns, viz., Andover, Boxford, Haverhill, Lawrence, Lynnfield, Methuen, Middleton, North Andover, North Reading, Reading and Wilmington, is now in the hands of the printer; and the material for another atlas, describing the boundaries of 14 cities and towns, viz., Ayer, Billerica, Carlisle, Chelmsford, Dracut, Dunstable, Groton, Littleton, Lowell, Pepperell, Shirley, Tewksbury, Tyngsborough and Westford, is being prepared for the printer.

On the first of December, 1905, atlases describing the boundaries of 139 cities and towns, out of a total of 354 in the Commonwealth, had been completed and distributed as provided by the statute; and an atlas containing the descriptions of 11 additional cities and towns was in the hands of the printer.

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Sale and Disposition of Massachusetts Atlas Sheets and Town Boundary Atlases.

There has been paid into the treasury of the Commonwealth during the year, under authority of chapter 57 of the Resolves of 1890 and chapter 360 of the Acts of 1900, the sum of $241.40, received from the sale of Massachusetts atlas sheets and town boundary atlases. Under chapter 360 of the Acts of 1900 one hundred and nineteen town boundary atlases have been distributed among the officers of the various cities and towns and others. Under chapter 95 of the Resolves of 1891 one topographical atlas has been given to the Civil Service Commission and one to the State Forester.

Inspections made during the Year.

The following inspections have been made by and under the direction of the Board: —

1905.

Mar. 28–30. Stage harbor, at Chatham; Herring River; Bass River, at South Yarmouth; Lewis Bay; East and West bays, at Osterville, — in company with legislative committee.

Apr. 24–26. Nantucket harbor; Vineyard Haven harbor; Menamsha Inlet; Cuttyhunk harbor; Paskamansett River and Apponagansett harbor, — in company with legislative committee.

May 1. Site of proposed pier in tide water, at Beverly.

May 3. Work in progress on the Commonwealth flats, at South Boston.

May 8. Work done by the Commonwealth at Bass River, South Yarmouth; East and West bays, Osterville; Cotuit harbor.

May 12. Site of proposed marine railway at Winthrop, in Boston harbor.

May 26. Protective works on Connecticut River, at Hadley and Hatfield.

June 6. Connecticut River bank, at West Springfield.

June 16. Bridge of New York, New Haven & Hartford Railroad Company across Cohasset Narrows, in Bourne and Wareham.

June 23. Province Lands, at Provincetown.

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1905.

June 27. Site of proposed breakwater north of Cherry island bar, in Revere, authorized by chapter 108, Resolves of 1905.

July 7. Paskamansett River; Cuttyhunk harbor; Menamsha Inlet; Vineyard Haven harbor; Lake Anthony and Nantucket harbor, — relative to improvements authorized by the Legislature.

July 13. Site of proposed bridge across Danvers River, between Salem and Beverly, and approaches thereto, authorized by chapter 371, Acts of 1903.

July 28. Site of proposed breakwater in Folly Cove, Gloucester.

Sept. 21. Nashawena Island, in relation to a harbor.

Oct. 7–9. Work done by the Commonwealth at Stage harbor; Bucks Creek; Witchmere harbor; Herring River; East and West bays, Osterville; Cotuit harbor.

Oct. 16. Dike on Connecticut River, at Hatfield, built by the Commonwealth.

Oct. 26–29. Boundary line between Massachusetts and New York.

Nov. 16. Work done by the Commonwealth at Stage harbor; Lewis Bay; Bass River, at South Yarmouth; Witchmere harbor; Herring River.

Licenses granted during the Year.

Nos.

2907. Petition of the Kilburn Mill for license to lay a pipe and construct two wells for condensing purposes in Clark's Cove, in the city of New Bedford. Granted Dec. 7, 1904.

2908. Petition of the Old Colony Railroad, the New York, New Haven & Hartford Railroad Company, lessee, for license to rebuild its bridge across Broad Cove, in Dighton and Somerset, and to fill solid. Granted Dec. 19, 1904.

2909. Petition of the Old Colony Railroad, the New York, New Haven & Hartford Railroad Company, lessee, for license to fill solid a portion of its bridge, known as Bridge No. 209, across a cove in Taunton River, in Taunton. Granted Dec. 19, 1904.

2910. Petition of Elbert S. Kip for license to build a pile wharf on Vineyard Sound, in Falmouth. Granted Dec. 19, 1904.

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Nos.

2911. Petition of the city of Boston for approval of plans for the construction and maintenance of a water pipe box and a tunnel for a water pipe across Fort Point Channel, near Dover Street bridge, under authority of chapter 273 of the Acts of 1904. Granted Dec. 26, 1904.

2912. Petition of Charles Whittemore for license to build a sea wall and fill solid in Buzzards Bay at Long Neck, in Wareham. Granted Dec. 28, 1904.

2913. Petition of the city of Salem for approval of plans for laying and maintaining a 60-inch iron pipe sewer in Collins Cove, in Salem, under authority of chapter 353 of the Acts of 1901. Granted Dec. 29, 1904.

2914. Petition of the Dartmouth Manufacturing Corporation for license to fill solid on Acushnet River, in New Bedford. Granted Dec. 29, 1904.

2915. Petition of Nancy E. Bliss for license to build and maintain a wharf, marine railway and float stage in Pocasset harbor at Pocasset, in Bourne. Granted Dec. 29, 1904.

2916. Petition of James H. Dwinell for license to build and maintain a pile pier and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2917. Petition of Linda Winsor for license to build and maintain a pile pier, marine railway and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2918. Petition of Henry N. Richards for license to build and maintain a pile pier and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2919. Petition of Boston & Maine Railroad for license to rebuild its Pier No. 5 on Charles River, in Boston. Granted Jan. 3, 1905.

2920. Petition of the Old Colony Street Railway Company for license to construct a pole line in and over North Watuppa Pond, in Fall River. Granted Jan. 23, 1905.

2921. Petition of the city of New Bedford for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2922. Petition of Greene & Wood for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2923. Petition of the Pairpoint Corporation for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

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Nos.

2924. Petition of Edith Hastings for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2925. Petition of Boston & Maine Railroad for license to build a temporary pile bridge across Merrimac River, in Haverhill. Granted Jan. 26, 1905.

2926. Petition of Francis J. Cain for license to build and maintain a pile wharf and float stage on Weymouth Fore River, in Weymouth. Granted Jan. 30, 1905.

2927. Petition of the Nobnocket Club for license to build a pile pier in Vineyard Haven harbor, in Tisbury. Granted Jan. 30, 1905.

2928. Petition of the Continental Export Company for license to build a pile wharf and to dredge in Boston harbor, at Spectacle Island. Granted Jan. 30, 1905.

2929. Petition of Alexander C. Adams and John A. Morse for license to build a pile and timber jetty in Cotuit Bay, at Cotuit, in Barnstable. Granted Jan. 30, 1905.

2930. Petition of Herbert M. Sears for license to build and maintain a pile pier and float stage in Salem harbor, in Beverly. Granted Feb. 3, 1905.

2931. Petition of Bessie Goldberg for license to build a pile structure on South River, in Salem. Granted Feb. 3, 1905.

2932. Petition of the Marblehead Transportation Company for license to build and maintain a sea wall, marine railway and float stages, and to fill solid, in Marblehead harbor, in Marblehead. Granted Feb. 10, 1905.

2933. Petition of the trustees of the New England Real Estate Trust, and the Walworth Manufacturing Company, for license to build bulkheads and fill solid in Boston harbor near the Reserved Channel, at South Boston. Granted March 6, 1905.

2934. Petition of the trustees of the New England Real Estate Trust for license to build bulkheads and fill solid in Boston harbor near the Reserved Channel, at South Boston. Granted March 6, 1905.

2935. Petition of Ella A. Chesley and William A. Rugg for license to construct a building over Little River, in Haverhill. Granted March 13, 1905.

2936. Petition of A. W. Davis and G. W. Harding for license to construct and maintain a building and pile platform on Duck Creek, in Wellfleet. Granted March 13, 1905.

2937. Petition of Lorenzo D. Baker for license to construct and maintain a building and pile platform on Duck Creek, in Wellfleet. Granted March 13, 1905.

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Nos.

2938. Petition of the Boston & Albany Railroad, the New York Central & Hudson River Railroad Company, lessee, for license to rebuild a bridge, on piles, on its Grand Junction Branch across Charles River, in Boston and Cambridge. Granted March 20, 1905.

2939. Petition of the city of Boston for license to rebuild and repair a portion of its wharf on the southerly side of Gallops Island, in Boston harbor. Granted March 23, 1905.

2940. Petition of William B. Stearns and George T. McKay for license to build a pile structure in Marblehead harbor, in Marblehead. Granted March 23, 1905.

2941. Petition of Emma F. Keith for license to build and maintain a pile pier, pile platform and float stage in Hull Bay, in Hull. Granted March 28, 1905.

2942. Petition of the Bliss Coal Company for license to build a pile wharf and to dredge in Lynn harbor, in Lynn. Granted March 28, 1905.

2943. Petition of G. Henry Whitcomb for license to extend his wharf, on piles, on Taunton River, in Fall River. Granted April 4, 1905.

2944. Petition of Albert T. Stearns for license to build a bulkhead and fill solid on Neponset River, in Boston. Granted April 6, 1905.

2945. Petition of the A. T. Stearns Lumber Company for license to build pile structures and fill solid on Neponset River, in Boston. Granted April 6, 1905.

2946. Petition of the estate of Edward R. Talbot for license to extend a wharf, on piles, on Taunton River, in Dighton. Granted April 18, 1905.

2947. Petition of Boston & Maine Railroad for license to extend the fender pier at Draw No. 1 in its bridge across Charles River, in Boston. Granted April 24, 1905.

2948. Petition of Boston & Maine Railroad for license to build and maintain a pile dolphin in Charles River, in Boston. Granted April 24, 1905.

2949. Petition of Catherine Hayes for license to build and maintain a pile pier and float stage in Buzzards Bay at Peters Neck, in Wareham. Granted April 28, 1905.

2950. Petition of Job Churchill for license to build a dike and flume and draw water from John's Pond, in Carver. Granted April 28, 1905.

2951. Petition of the Cottage Park Hotel Corporation for license to build embankments and to excavate in Boston harbor, in Winthrop. Granted May 3, 1905.

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Nos.

2952. Petition of the Sewer Commissioners of Fairhaven for license to build and maintain sewers in Acushnet River, in Fairhaven. Granted May 3, 1905.

2953. Petition of the Cambridge Bridge Commission for approval of plans for the construction of a highway bridge without a draw therein, across Charles River between Boston and Cambridge, to be known as Brookline Street bridge, under authority of chapter 391 of the Acts of 1904. Granted May 5, 1905.

2954. Petition of William H. Moore for license to extend a pier, on piles, and locate and maintain a float stage in Massachusetts Bay, in Beverly. Granted May 9, 1905.

2955. Petition of the Charlestown Gas and Electric Company for license to extend its wharf, partly solid and partly on piles, on Mystic River, in Boston. Granted May 9, 1905.

2956. Petition of Burgess & Packard for license to build and maintain two marine railways, on piles, a portion of a building, and a float stage, in Marblehead harbor, in Marblehead. Granted May 11, 1905.

2957. Petition of Freeman M. Crosby for license to build and maintain a pile pier on Vineyard Sound at Centerville, in Barnstable. Granted May 11, 1905.

2958. Petition of the town of Plymouth for license to build and maintain a sewer outlet in Plymouth harbor, in Plymouth. Granted May 15, 1905.

2959. Petition of the Edison Electric Illuminating Company of Boston for license to rebuild and strengthen a portion of its wharf on Fort Point Channel, in Boston. Granted May 16, 1905.

2960. Petition of the Haverhill & Boxford Street Railway Company for approval of plans for the construction of a bridge and approaches thereto across Merrimac River, in Haverhill, under authority of chapter 449 of the Acts of 1904, and chapter 130 of the Acts of 1905. Granted May 17, 1905.

2961. Petition of the Holyoke Water Power Company for license to erect structures for a power plant and to build and extend a shore wall on Connecticut River, in Holyoke. Granted May 17, 1905.

2962. Petition of Guy Norman for license to build and maintain a pile pier in Beverly harbor, in Beverly. Granted May 18, 1905.

2963. Petition of the County Commissioners of Essex County for approval of plans for the construction of a bridge and

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Nos.

approaches thereto across Merrimac River, in Haverhill, under authority of chapter 466 of the Acts of 1903, and chapter 411 of the Acts of 1905. Granted May 22, 1905.

2964. Petition of Mary A. Whiting for license to build and maintain a pier in Marion harbor, in Marion. Granted May 22, 1905.

2965. Petition of Catherine Doherty for license to extend a wharf, partly solid and partly on piles, in Dorchester Bay, in Boston. Granted May 31, 1905.

2966. Petition of the city of Boston for approval of plans for the construction and maintenance of a tunnel for a water pipe under the south channel of Mystic River, in Boston, under authority of chapter 273 of the Acts of 1904. Granted June 6, 1905.

2967. Petition of Leonard Thompson for license to build a sea wall, construct a dolphin, fill solid and to dredge, in Hingham harbor, in Hingham. Granted June 8, 1905.

2968. Petition of Boston & Maine Railroad for license to extend piers 6 and 7 at the Hoosac Tunnel Docks on Charles River, in Boston. Granted June 8, 1905.

2969. Petition of Samuel L. Minot and the estate of Joshua Crane for license to build and maintain a pile pier and float stage in Pocasset harbor, in Bourne. Granted June 8, 1905.

2970. Petition of the Home Club for license to build and maintain a pile pier in Edgartown harbor, in Edgartown. Granted June 9, 1905.

2971. Petition of Herbert M. Chase for license to build and maintain a boat landing in Lake Anthony, in Cottage City. Granted June 26, 1905.

2972. Petition of the Haverhill Electric Company for license to lay cables in and under Merrimac River, in Haverhill. Granted June 26, 1905.

2973. Petition of the city of Haverhill for license to construct a submerged outlet for the Mill Street sewer system, in Merrimac River, in Haverhill. Granted June 26, 1905.

2974. Petition of Frederick E. Baker and Zenia E. Strout for license to build a sea wall and fill solid in Lynn harbor, in Nahant. Granted June 29, 1905.

2975. Petition of John C. Haynes for license to build a pile pier and timber breakwater in Buzzards Bay at Sippowissett, in Falmouth. Granted June 29, 1905.

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Nos.

2976. Petition of the Marblehead Transportation Company for license to build and maintain a sea wall, marine railway and float stages, and to fill solid, in Marblehead harbor, in Marblehead. Granted July 11, 1905.

2977. Petition of Henry H. Fay for license to build and maintain a marine railway and to dredge, in Woods Hole Great harbor at Woods Hole, in Falmouth. Granted July 20, 1905.

2978. Petition of the Cape Cod Cranberry Company for license to build a flume and draw water from Cook's Pond, in Plymouth. Granted July 20, 1905.

2979. Petition of the Turners Falls Lumber Company for license to hang and maintain two booms in Connecticut River, in Gill and Montague. Granted July 20, 1905.

2980. Petition of the County Commissioners of Essex County for license to build a temporary bridge over the "Canal," in Gloucester. Granted July 28, 1905.

2981. Petition of Paul Butler and Blanche Butler Ames for license to extend their wharf in Gloucester harbor, in Gloucester. Granted July 31, 1905.

2982. Petition of the city of Gloucester for license to build and maintain a pipe way and conduits across the "Canal" near the Cut bridge, in Gloucester. Granted Aug. 1, 1905.

2983. Petition of the Valvoline Oil Company for license to build a pile wharf on Chelsea Creek, in Chelsea. Granted Aug. 1, 1905.

2984. Petition of the Federal Contracting Company for license to build and maintain breakwaters in tide water at Folly Point, in Gloucester. Granted Aug. 25, 1905.

2985. Petition of the Metropolitan Park Commission for license to fill solid at the Quincy Shore Reservation with material dredged from Quincy Bay, and to build a drawless bridge over Sachem Brook, in Quincy. Granted Aug. 25, 1905.

2986. Petition of the County Commissioners of Hampden County for approval of plans for the construction of a bridge over Connecticut River, connecting Exchange Street in Chicopee with Wayside Avenue in West Springfield, under authority of chapter 398 of the Acts of 1904. Granted Sept. 5, 1905.

2987. Petition of the city of Haverhill for license to construct a submerged sewer outlet in Merrimac River, in Haverhill. Granted Sept. 12, 1905.

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Nos.

2988. Petition of the town of Hadley for license to build a drain for surface water and an outfall therefor, on the bank of Connecticut River, in Hadley. Granted Sept. 15, 1905.

2989. Petition of the trustees under the will of John C. Inches, trustees under the will of Martin Brimmer, and others, for license to build a pile wharf at the westerly end of the dock between T Wharf and Long Wharf, in Boston. Granted Sept. 19, 1905.

2990. Petition of the Proprietors of Boston Pier or the Long Wharf for license to build a pile wharf at the westerly end of the dock between Long Wharf and T Wharf, in Boston. Granted Sept. 19, 1905.

2991. Petition of Lennox & Briggs and the Haverhill Gas Light Company for license to lay and maintain a pipe in Little River, in Haverhill. Granted Sept. 26, 1905.

2992. Petition of the Salem Electric Lighting Company for license to rebuild its sea wall, build a new sea wall, drive piles and fill solid, on South River, in Salem. Granted Sept. 28, 1905.

2993. Petition of the Boston Tow Boat Company for license to build a pile pier and to dredge in Boston harbor, at East Boston. Granted Sept. 28, 1905.

2994. Petition of the Nantasket Beach Steamboat Company for license to widen its wharf, on piles, and to build three dolphins, on Weir River, in Hull. Granted Oct. 4, 1905.

2995. Petition of the Walworth Manufacturing Company for license to extend its wharf in Boston harbor near the Reserved Channel, at South Boston. Granted Oct. 4, 1905.

2996. Petition of F. T. Akin & Co. for license to extend their wharf, partly solid and partly on piles, on Acushnet River, in New Bedford. Granted Oct. 5, 1905.

2997. Petition of the city of Boston for license to rebuild its wharf in Boston harbor at the North Ferry, in East Boston. Granted Oct. 5, 1905.

2998. Petition of the heirs of William E. Gutterson for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

2999. Petition of the heirs of Sarah H. Stratton for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

3000. Petition of the heirs of Nelson Shumway for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

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Nos.

3001. Petition of the city of Boston for license to widen the opening for the passage of vessels in Dover Street bridge on Fort Point Channel, in Boston. Granted Oct. 12, 1905.

3002. Petition of Charles W. Adams for license to build and maintain a pile pier and float stage in Onset Bay, in Wareham. Granted Oct. 31, 1905.

3003. Petition of Boston & Maine Railroad for license to widen its pile platform at Mystic Wharf on the north channel of Mystic River, and to dredge, in Boston. Granted Oct. 31, 1905.

3004. Petition of the Metropolitan Park Commission for license to fill solid and to dredge in Broad Sound at the Revere Beach Reservation, in Revere. Granted Nov. 13, 1905.

3005. Petition of the city of Boston for license to dump snow and ice into tide waters. Granted Nov. 17, 1905.

3006. Petition of the Boston Elevated Railway Company for license to dump snow and ice into tide waters. Granted Nov. 17, 1905.

3007. Petition of the Union Freight Railroad Company for license to dump snow and ice into Charles River, in Boston. Granted Nov. 17, 1905.

3008. Petition of Mary A. Curry for license to build and maintain a pile wharf and a float stage on Back River at Monument Beach, in Bourne. Granted Nov. 20, 1905.

3009. Petition of the County Commissioners of Essex County for approval of plans for building a bridge over the "Canal" in Gloucester, under authority of chapter 254 of the Acts of 1905. Granted Nov. 20, 1905.

3010. Petition of Charles E. Davis for license to build and maintain a pile wharf on Lees River, in Swansea. Granted Nov. 21, 1905.

3011. Petition of Malvina S. Nazro for license to build and maintain a pile wharf and float stage in Buzzards Bay, in Wareham. Granted Nov. 21, 1905.

3012. Petition of the County Commissioners of Essex County for approval of plans for the construction of a highway bridge and approaches thereto, over Danvers River, between Salem and Beverly, under authority of chapter 371 of the Acts of 1903. Granted Nov. 24, 1905.

Petitions denied and withdrawn.

On Dec. 21, 1904, the petition of David C. Percival for license to build a retaining wall in Marblehead harbor, at

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Marblehead Neck, was dismissed, it appearing from the deed submitted that there is a restriction against building any structure on the beach in front of upland owned by the petitioner.

On March 23, 1905, it was voted not to lease Noon Island, so called, in Ponkapoag Pond, on petition of Fred H. Bixby and S. Austin Thayer, as it was wanted for the Metropolitan Park.

On April 27, 1905, the Board declined to lease Berry Island in Lake Winthrop, in Holliston, for fear of a possible nuisance.

On May 10, 1905, the petition of the town of Marblehead for license to extend Cliff Street in tide water of Marblehead harbor, was dismissed without prejudice.

On May 17, 1905, the petition of Ambrose A. Martin for license to maintain a pile pier and marine railway in Boston harbor, in the town of Winthrop, was further considered; and it was voted, after public hearing, consideration of statements of petitioner and arguments of counsel and examination of premises, that the building of proposed structures should not be authorized, and the petitioner was given leave to withdraw.

On Oct. 9, 1905, the Columbian Dredging Company, petitioner for authority to dump dredged material on flats near Hunts Hill Point, in Weymouth, was granted leave to withdraw, as the owners of property in the vicinity objected to the same, claiming that it would interfere with access to their land.

On Oct. 25, 1905, the New York, New Haven & Hartford Railroad Company, petitioner for license to draw water from Dennis Pond, in Yarmouth, at its request was given leave to withdraw.

MISCELLANEOUS PERMITS GRANTED DURING THE YEAR.

WATER DEPARTMENT OF THE CITY OF BOSTON, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Dec. 23, 1904.

BOSTON ELEVATED RAILWAY COMPANY, to dump snow and ice on the Commonwealth flats at South Boston. Granted Dec. 27, 1904.

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ISAAC BLAIR & Co., to dump snow from Dover Street bridge into tide water, in Boston. Granted Dec. 28, 1904.

THOMAS BUTLER & Co., to use for storage purposes a portion of the Commonwealth pier at South Boston. Granted Dec. 29, 1904. .

FRANK J. HANNON, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 2, 1905.

CHARLES DUNCAN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 2, 1905.

THOMAS BUTLER & Co., to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

ESTATE OF PATRICK O'RIORDEN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

JAMES MCGOVERN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

JONES & MEEHAN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 13, 1905.

JAMES F. DOOLEY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 16, 1905.

MARY DOYLE, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 24, 1905.

H. P. NAWN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 24, 1905.

MOULTON & HOLMES, to dump ashes on the Commonwealth flats at South Boston. Granted Feb. 7, 1905.

GEORGE G. CROCKER, ALVIN F. SORTWELL and FREDERIC D. FISK, trustees of the Main Street Land Trust, to dredge material from their flats in Charles River, on the Cambridge side of the channel, near Cambridge bridge. Granted Feb. 8, 1905.

JAMES FEELEY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Feb. 27, 1905.

JAMES MCGOVERN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Feb. 27, 1905.

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THOMAS A. ELSTON & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted March 8, 1905.

JAMES S. SWEENEY, to dump engine ashes on the Commonwealth flats at South Boston. Granted March 9, 1905.

JOSEPH L. BOARDMAN, to remove gravel from Salter's beach, in Plymouth. Granted March 15, 1905.

NAHANT & LYNN STREET RAILWAY COMPANY, to dredge flats in Lynn harbor, in the town of Nahant, for the purpose of obtaining material for constructing its road bed. Granted April 6, 1905.

BAY STATE DREDGING COMPANY, to dredge material from Boston harbor, southwesterly of Deer Island. Granted April 10, 1905.

ESTATE OF PATRICK O'RIORDEN, to dredge material from Boston harbor, southwesterly of Deer Island. Granted April 10, 1905.

STANDARD OIL COMPANY of New York, to dredge in Chelsea Creek, at and near its property known as Maverick Dock. Granted April 12, 1905.

METROPOLITAN PARK COMMISSION, to excavate material in Lynn harbor. Granted April 18, 1905.

JONES & MEEHAN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted May 4, 1905.

C. W. JOHNSON, to remove rocks from the channel of Connecticut River at the "Rapids," between Northampton and South Hadley. Granted May 9, 1905.

COLEMAN BROTHERS, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted May 31, 1905.

COLEMAN BROTHERS, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted June 2, 1905.

R. S. BRINE TRANSPORTATION COMPANY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted June 12, 1905.

DAVID BENSHIMOL, to remove stones, kelp and sea weed from Back beach, opposite Sewall Avenue, in Winthrop. Granted June 29, 1905.

R. S. BRINE TRANSPORTATION COMPANY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 3, 1905.

WILLIAM BARRETT, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 10, 1905.

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Milton Da Costa, to use and occupy Quarantine Rock, in Boston harbor. Granted July 11, 1905.

New Bedford, Marthas Vineyard & Nantucket Steamboat Company, to excavate in the dock adjoining the wharf of the New York, New Haven & Hartford Railroad Company, in Woods Hole Great harbor at Woods Hole, in Falmouth. Granted July 20, 1905.

Bay State Dredging Company, to dump material dredged from Lynn harbor at the Nahant Beach Parkway. Granted July 20, 1905.

William J. Rafferty & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 26, 1905.

Bay State Dredging Company, to dump material dredged from Lynn harbor on Longfellow beach, in Nahant. Granted July 31, 1905.

Thomas A. Elston & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Sept. 12, 1905.

Henry H. Sylvester, to remove stone from the beach at North Scituate, south of the life-saving station. Granted Sept. 12, 1905.

Metropolitan Park Commission, to dump material excavated from Lynn harbor on the northerly portion of the Revere Beach Reservation. Granted Oct. 17, 1905.

Nantasket Beach Steamboat Company, to remove accumulations of sand in the berths and around Pemberton pier, in Hull. Granted Oct. 18, 1905.

T. F. Wholey, to dump ashes on the Commonwealth flats at South Boston. Granted Oct. 31, 1905.

Boston Bridge Works, to build a temporary pile trestle for the purpose of rebuilding the superstructure of the Boston & Albany Railroad bridge on Connecticut River, in Springfield. Granted Oct. 31, 1905.

Bay State Dredging Company, to dump material excavated from Chelsea Creek, in Belle Isle Inlet and adjacent creeks, in Boston and Revere. Granted Nov. 3, 1905.

Eastern Dredging Company, to dump material excavated from Malden River in the old bed of said river and on certain flats therein. Granted Nov. 9, 1905.

Boston Elevated Railway Company, to dump snow and ice on the Commonwealth flats at South Boston. Granted Nov. 27, 1905.

Edward W. Dixon, to place the steamer "King Philip" in the Commonwealth dock at South Boston. Granted Nov. 27, 1905.

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Work of the United States in Rivers and Harbors of the Commonwealth.

The Board is indebted to Col. W. S. Stanton, Corps of Engineers, U. S. A., who is in charge of river and harbor improvements in eastern Massachusetts, and Lieut.-Col. J. H. Willard, Corps of Engineers, U. S. A., who is in charge of similar work in southern Massachusetts, for the following statements, which show the work accomplished in the rivers and harbors of the Commonwealth during the fiscal year ending June 30, 1905: —

Statement of Col. W. S. Stanton, Corps of Engineers, U. S. A.

Boston, Mass., Dec. 20, 1905.

Board of Harbor and Land Commissioners, Commonwealth of Massachusetts, State House, Boston, Mass.

Sirs: — In compliance with your request of Nov. 2, 1905, I have the honor to furnish the following summary of work accomplished by the United States during the fiscal year ended June 30, 1905, upon the improvement of rivers and harbors in Massachusetts under my charge.

Newburyport Harbor.

Under a contract for repairing both jetties at the mouth of the Merrimac River, and for extending the south jetty, 11,328 tons of rubble stone were deposited in the south jetty. The work which was in progress at the close of the fiscal year has been since completed, 300 linear feet of the south jetty and 550 linear feet of the north jetty having been re-topped, and the south jetty extended 291 feet. Funds are available for extending the north jetty 175 feet, for which a contract will be made during the winter. By a survey made in 1905 it appears that the depth on the bar at the mouth of the river, which prior to the construction of jetties was 7 feet, is now 13 feet, at mean low water.

Breakwater for Harbor of Refuge, Sandy Bay, Cape Ann.

During the year, under a contract (since completed), 62,510½ tons of stone were placed in the western, and 31,786 tons in the southern, arm; total, 94,296½ tons. This breakwater is to be 9,000 feet in length. At the close of the fiscal year it had been built to about mean low water for a length of 2,250 feet, and to partial heights below mean low water for 5,280 feet additional.

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Rockport Harbor.

Several small ledges of rock were removed, amounting to 130.6 cubic yards.

Gloucester Harbor.

In the breakwater at the entrance to this harbor 34,040½ tons of stone were deposited, completing 843 feet of the superstructure. Since the close of the year the entire breakwater, 2,065 feet in length, has been completed, including a rubble mound at its end for a lighthouse site.

Lynn Harbor.

Under the project to dredge the channel 200 feet wide from the sea to the anchorage basin, and the anchorage basin itself to the depth of 15 feet at mean low water, a continuing contract was made for the completion of the entire improvement by June 30, 1907, and dredging commenced two days before the close of the fiscal year.

Boston Harbor.

Twenty-seven-foot Channel. — In the Narrows the excavation of 24 ledges, covering nearly 4 acres, and amounting to 19,231 cubic yards of rock, has been in progress throughout the year, and has been completed except the removal of a few small points of solid rock and some scattered débris. Early in the year 1906 all ledges will have been removed from this channel 1,000 feet wide and 27 feet in depth from President to Nantasket Roads. During the year 73,441 cubic yards of mud, sand, gravel and clay have been dredged from the channel, in maintenance.

In the upper main ship channel from President Roads to Boston the removal of 11 ledges, embracing 2,066 cubic yards, has been in progress and is substantially completed, except the removal of a few small points of solid rock and scattered débris. The only other ledge remaining to be removed to complete the 27-foot channel is also to be removed in obtaining the 35-foot channel, and has been drilled and blasted, and the dredging of the fractured rock, with the removal of the few points above mentioned, is all that remains to complete the 27-foot channel from Boston to Nantasket Roads.

Thirty-foot Channel. — In Broad Sound 39,568 cubic yards of sand and gravel have been dredged, and 2 ledges of rock containing 156 cubic yards have been removed, completing the channel to the authorized width of 1,200 feet and depth of 30 feet at mean low water from President Roads to the sea. For guiding vessels from the coast to this channel a lighthouse has also been completed on the Graves, from which the light was first exhibited

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Sept. 1, 1905, completing, with the range lights on Lovells Island for the seaward arm and on Spectacle Island for the inner arm, the lighting of this channel.

Thirty-five-foot Channel. — Under this project, during the year, from the channel between President Roads and the Navy Yard, Chelsea and Charles River bridges, there were dredged 2,090,011 cubic yards of mud, sand, clay, etc., and 4.2 cubic yards of bowlders; and from the channel between President Roads and the sea, 152,391.5 cubic yards of sand, gravel and clay; making a total of 2,242,506.7 cubic yards. April 26, 1905, a contract was made for excavating 16,555 cubic yards of rock, covering nearly 3 acres, to the depth of 35 feet at mean low water.

Sea Walls. — Minor repairs, consisting of pointing and protecting their foundations with riprap, were made to portions of the 3 miles of sea walls that protect the islands and headlands from the harbor.

Plymouth Harbor.

For the security of this harbor a dike of riprap for the preservation of Long beach was extended 1,375 feet, being now 11,843 feet in length.

Provincetown Harbor.

Under the project to arrest the erosion and promote the accretion of the barrier of beach and sand dunes which preserves the harbor, the works of protection have been extended and repaired during the fiscal year as follows. At Long Point 1,093 tons of rubble stone were deposited, completing to the full cross-section 120 linear feet of new breakwater, and re-topping 65 feet of old breakwater. In the vicinity of Abel Hill dike 191 feet of double bulkhead, 420 feet of single bulkhead and 10,964 feet of sand-catches were built, and 906 feet of bulkhead and 1,800 feet of sand-catches repaired. At Wood End bulkhead 1,750 linear feet of sand-catches were built, and minor repairs made elsewhere.

Very respectfully,

W. S. STANTON,
Colonel, Corps of Engineers.

Statement of Lieut.-Col. J. H. Willard, Corps of Engineers, U. S. A., showing the work done by the United States on the rivers and harbors of Massachusetts under the Newport, R. I., engineer office, during the fiscal year ending June 30, 1905: —

Hyannis Harbor.

The work of dredging in the anchorage area protected by the breakwater, in progress at the beginning of the fiscal year, was completed Sept. 3, 1904. The amount of material removed under

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the contract was 75,000 cubic yards. The total area to be deepened to 15.5 feet at mean low tide under the existing project for the improvement was 36 acres; of this, 34.5 acres have now been completed.

The river and harbor bill of March 3, 1905, appropriated $80,000 for the improvement of the harbors of Hyannis and Nantucket; of this amount, $10,000 was allotted for the completion of the project for the improvement of Hyannis harbor. A contract was entered into May 26, 1905, for dredging at both these harbors. The small amount of work at Hyannis harbor will be commenced about the time of the completion of the Nantucket work.

Nantucket Harbor.

The work under the contract of E. S. Belden & Sons of Hartford, Conn., for placing stone in the gap in the east jetty, in progress at the close of the last fiscal year, was completed July 21, 1904. Under this contract a total of 4,604 tons of stone were placed in the gap, by which it was filled to the level of mean low water.

The approved project for the expenditure of the $70,000 allotted to this work from the appropriation of March 3, 1905, for the improvement of Hyannis and Nantucket harbors, provides for extending the eastern jetty about 1,200 feet, repairing portions of the jetty, and dredging a channel about 200 feet wide and 12 feet deep at mean low water through the bar between the jetties.

A contract was entered into with E. S. Belden & Sons of Hartford, Conn., for stone work in the jetty, at the rate of $1.73 per ton, May 26, 1905. Work under this contract commenced June 5, 1905, and up to the close of the fiscal year 2,909½ tons of stone had been placed in the jetty.

Under date of May 26, 1905, a contract was entered into with the Morris & Cumings Dredging Company of New York for the dredging of the jetty channel, at the rate of 23.9 cents per cubic yard. The dredge commenced work June 23, 1905, and up to the close of the fiscal year 7,039 cubic yards had been dredged.

The breachway in the "Haulover" beach, separating the head of the harbor from the ocean on the eastern side of the island, has afforded an outlet for a large portion of the water which would otherwise have had to flow through the jetty channel. It is believed that the blocking up of the jetty entrance to the harbor by the jetties has contributed in no small degree to keeping the breach in the "Haulover" open. As it would be impracticable to close this breach by artificial means save at great expense, it was recommended that $50,000 of the allotment for this work from the appropriation of March 3, 1905, be applied to dredging, partly with a view to increasing the water way

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through the jetty channel, and thereby assisting in closing the breach in the "Haulover."

Vineyard Haven.

No works of improvement were in progress during the fiscal year. Further work at this harbor is dependent upon the results of the examination of the Board of Engineers, convened in accordance with the river and harbor act of June 13, 1902, to consider the general subject of harbors in the waters of this locality.

Little Harbor, Woods Hole.

The river and harbor act of March 3, 1905, appropriated $18,000 for dredging a channel 150 feet wide and 12 feet deep at mean low water from Vineyard Sound to the wharf of the lighthouse depot in Little Harbor, with a basin 300 feet wide and of the same depth in front of the wharf.

Under date of June 16, 1905, a contract was entered into with Charles M. Cole of Fall River, Mass., for doing this work, at the rate of 21 cents per cubic yard. The work of dredging was commenced June 26, and up to the close of the fiscal year 3,114 cubic yards of sand and gravel had been removed.

Woods Hole.

The river and harbor act of March 3, 1905, appropriated $70,000 for the improvement of the channel leading from Woods Hole to Buzzards Bay, and authorized the expenditure of an additional $100,000 for this work.

A project for the expenditure of the funds thus appropriated, contemplating the completion of the projected channel, had been approved, and specifications for the work had been prepared.

Weepecket Rock, Buzzards Bay.

This rock in Buzzards Bay off Uncatena Island, and in almost the direct line of travel from New Bedford to Woods Hole, in foggy weather, was a menace to vessels entering the Woods Hole strait from the Buzzards Bay end. Provision was made in the river and harbor bill of March 3, 1905, for its removal to a depth of about 10 feet.

Under date of June 5, 1905, a contract was entered into with Chas. E. Davis of New Bedford for the removal of this rock, for the lump sum of $1,380. The removal was completed July 3, 1905.

New Bedford Harbor.

The river and harbor bill appropriated $11,000 for dredging certain shoal areas along the wharf front both above and below

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the new Fairhaven bridge, and cutting off the shoal spit extending northwardly from Fish Island.

Under date of May 31, 1905, a contract was entered into with Charles M. Cole of Fall River, Mass., for the proposed dredging, and the work was completed June 21, 1905. The total amount of mud and sand removed was 54,446 cubic yards.

Taunton River.

An appropriation of $5,000 was made for the maintenance of the channel, which it was deemed desirable to retain until the season of 1906.

Fall River Harbor and Mount Hope Bay.

The work in progress at the beginning of the fiscal year, under the continuing contract with the J. S. Packard Dredging Company of Providence, R. I., for dredging a channel 300 feet wide and 25 feet deep at mean low tide in front of the city and across the flats in Mount Hope Bay, was continued until Sept. 6, 1904, when the work was completed. The total amount dredged under this contract was 1,091,462 cubic yards.

Removal of Wrecks.

The following wrecks were removed so as no longer to form obstructions to navigation: barkentine "Albertina," sunk on Chatham Bar; schooner "Viloa May," sunk on Shovelful Shoal; schooner "Frauline," sunk northeast of the northwest buoy on Common Flat, Chatham; schooner "Richard S. Leaming," sunk off Cross Rip Light Ship; schooner "Anna Laura," sunk 1¼ miles off Harding's beach, Chatham; steamship "Aransas," sunk in Pollock Rip Channel. The removal of the last-named wreck was in progress at the close of the fiscal year.

Preliminary Examinations and Surveys.

Provision was made in the river and harbor bill of March 3, 1905, for the examination of New Bedford harbor, with a view to obtaining additional anchorage grounds and increased depth.

Appropriation for Survey and Improvement of Harbors.

By chapter 12 of the Acts of 1904 an appropriation of $5,000 was made for surveys of harbors and for improving and preserving the same, and for repairing damages occasioned by storms along the coast line or river banks of the Commonwealth.

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The following expenditures from this appropriation, in addition to those recited in the last report, were made in December, 1904, under the authority of section 9 of chapter 96 of the Revised Laws: —

Dredging southerly shore of South Boston,	$60 00
Red River, Chatham,	10 00
Vineyard Haven harbor,	3 00
West Bay, Osterville,	111 45
Total,	$184 45

In 1905 the appropriation for the same purpose was $5,000, from which sum expenditures have been made to December 1, in the localities and to the amounts following, viz.: —

Bass River, Yarmouth,	$49 93
Charles River,	91 80
Connecticut River, West Springfield,	135 00
Cuttyhunk harbor,	32 95
East Bay, Osterville,	31 42
Herring River,	48 75
Lake Anthony,	25 00
Lewis Bay,	90 94
Nantucket harbor,	107 94
Paskamansett River,	92 15
Red River, Chatham,	20 25
Stage harbor, Chatham,	102 00
West Bay, Osterville,	120 75
Witchmere harbor,	404 00
Total,	$1,352 88

Harbor Compensation Fund.

There was paid into the treasury of the Commonwealth during the year, under chapter 146 of the Acts of 1897, and chapter 96 of the Revised Laws, for tide water displaced by work done under licenses granted by the Board, and for rights and privileges granted in tide waters and great ponds, the sum of $105,257.52, which was credited to the harbor compensation fund for Boston harbor. The amount in this fund on Nov. 30, 1905, was $529,506.91; the balance of income from this fund in the treasury on the same date was $24,378.18; the total income for the year was $20,482.28.

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COMMONWEALTH'S FLATS IMPROVEMENT FUND.

The balance in the Commonwealth's flats improvement fund on the first day of December, 1904, was $1,315,014.67. To this has been added during the year $44,348.12 from the income of the fund and $28,305.90 from sales and rents of lands and other sources, making a total of $1,387,668.69. Of this sum there has been expended during the year $37,612.18, leaving a balance on Nov. 30, 1905, of $1,350,056.51, subject to reduction for existing liabilities by reason of the anchorage basin contracts under chapter 476 of the Acts of 1901, and for contribution toward building Northern Avenue and bridge under section 4 of chapter 381 of the Acts of 1903.

The Board requests that a further appropriation be made out of this fund, to be expended in improvements upon the Commonwealth's flats at South Boston, and for work therewith connected.

The foregoing report is respectfully submitted.

WOODWARD EMERY,
GEORGE E. SMITH,
HENRY J. SKEFFINGTON,
Commissioners.

DEC. 1, 1905.

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APPENDIX.

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APPENDIX.

[A.]

[See page 4 of this report, *ante*.]

CONTRACTS.

The contracts entered into during the year are as follows: —

1904.		
Dec. 1.	With C. A. Callahan and J. J. Callahan, for strengthening with stone riprap the outer portion of the eastern jetty at Bass River, Yarmouth, — amounting to	$4,578 98
1905.		
June 27.	With Joseph J. Callahan, for building dikes at the cut-through into Stage harbor, Chatham, — amounting to	7,143 81
July 26.	With the Eastern Dredging Company, for dredging in Fort Point Channel, — amounting to .	4,119 16
July 27.	With Thomas & Connor, for building new channel at mouth of Herring River, in Harwich, — amounting to	11,141 02
July 28.	With Daniel O'Connell's Sons, for building dike on the Connecticut River, at Hatfield, — amounting to	1,445 13
Aug. 2.	With the Bay State Dredging Company, for dredging at Paskamansett River, Lewis Bay and Witchmere harbor, — amounting to about . . .	9,650 00
Aug. 25.	With the Morris & Cumings Dredging Company, for dredging in Nantucket harbor, — amounting to	4,684 96
Aug. 25.	With William L. Miller, for building an extension to the concrete sea wall at Stony beach, Hull, — amounting to	2,728 82
Sept. 8.	With E. S. Belden & Sons, for building stone breakwater at Vineyard Haven harbor, — amounting to about	10,000 00
Sept. 15.	With William M. Swasey, for removing wreck of schooner "Annie E. Lane," at Beverly, — amounting to	250 00

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1905.		
Sept. 28.	With Joseph J. Callahan, for building jetties at Cuttyhunk, — amounting to about . . .	$5,000 00
Oct. 30.	With the New England Dredging Company, for dredging between Savin Hill and Commercial Point, Dorchester, — amounting to about . .	9,500 00
Nov. 20.	With the Eastern Dredging Company, for dredging in Fort Point Channel, in Boston harbor, — amounting to about	2,500 00
	Total, ...	$72,741 88

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[B.]

[See page 45 of this report, *ante*.]

REPORT OF THE SUPERINTENDENT, PROVINCE LANDS.

PROVINCETOWN, MASS., Nov. 30, 1905.

To the Board of Harbor and Land Commissioners.

GENTLEMEN: — In continuing the work on these lands, the same methods of treatment have been pursued as in previous years, namely, the transplanting of beach grass, trees and shrubs.

This season's work was commenced as soon as the ground was free from frost, about the first of April, and continued until the latter part of May, during which time the principal work was the transplanting of bayberry and young seedling pines. A considerable area of bayberry was planted, and about 20,000 seedling pines taken from the adjacent woods and bogs. Ninety per cent. of the bayberry lived and are doing well; but owing to the extreme drought which prevailed during the spring, only a small percentage of the seedling pines survive, while under favorable conditions of weather at least 80 per cent. should live and thrive.

Only 1 acre of grass was planted in the spring, as it has been demonstrated that the best results can be obtained from fall planting; therefore attention was given, until the latter part of May, to tree and shrub planting, and to keeping the roads through the lands in good condition for summer travel.

The work of transplanting beach grass was resumed in September, a portion of the force being thus engaged, and others employed in planting bayberry, the work being continued until the middle of November, covering during that time about 30 acres of the dunes, on a large part of which bayberry was planted.

On the outer range of sand dunes, where the work was started ten years ago, there has been a steady improvement from year to year; and it is reasonably certain that this range is permanently protected from any destructive forces, simply requiring protection from destructive human agencies in the future.

Of the many trees and shrubs which seem to be native to this section, some apparently spring up spontaneously where the sand is quiet; and in order to promote this growth, a great part of the

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work has been the transplanting of beach grass for the purpose of holding the sands preparatory to the introduction of a more permanent plant growth, namely, trees and shrubs.

A total of about 270 acres has been covered with grass since work of this character was commenced, in the spring of 1895, and within this area there have been planted large quantities of trees and shrubs, the larger part being bayberry or wax myrtle (*Myrica cerifera*), which has proved to be a quick grower, making a solid and close covering.

Of the trees planted, the most valuable for this work are the three varieties of pine, namely, native pitch (*Pinus rigida*), Scotch (*Pinus sylvestris*) and Austrian (*Pinus Austriaca*), which make satisfactory growth, and are well adapted to this soil and climate.

Bound "A" was moved by the ice last winter, and has been re-set in a cement foundation of sufficient size to withstand any pressure from that cause in the future.

Respectfully submitted,

JAMES A. SMALL,
Superintendent of the Province Lands.

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